METROPOLITAN DISTRICT COMMISSION
DIVISION OF WATERSHED MANAGEMENT
QUABBIN SECTION

2001 WATER QUALITY REPORT

Quabbin Reservoir Watershed
Ware River Watershed

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The U.S. Geological Survey through a cooperative agreement established with the MDC provided tributary flow data appended to this report.

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ADDITIONAL INFORMATION –
EPA Safe Drinking Water Hotline (800) 426-4791
MDC Home Page: http//www.magnet.state.ma.us/mdc

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EXECUTIVE SUMMARY

The Metropolitan District Commission, Division of Watershed Management is legislatively mandated to manage and maintain a system of watersheds and reservoirs in order that pure water could be provided to the Massachusetts Water Resources Authority (MWRA). Specifically, Chapter 372 of the Acts of 1984 established the MWRA as in independent agency whose chief responsibility was the delivery and distribution of drinking water to approximately 2.5 million people across Massachusetts. The primary function of the MDC in this partnership is to provide active watershed management, the first line of defense against drinking water contamination.

A major effort of the Division's watershed management program is its water quality monitoring program. The MDC Quabbin Section currently operates a state-certified water quality testing laboratory staffed by a diverse group of professionals, collectively referred to as the Environmental Quality Section. EQS staff are trained in a variety of areas including microbiology, public health and the environmental sciences. In 2001, the MDC laboratory processed 3,252 individual tributary and reservoir samples for in-house analysis; 2,257 samples for microbiological analysis and 995 samples for chemical analysis. Results from the extensive water quality program are used to: assess compliance with Massachusetts drinking water standards for source waters; to assess the ecological health of the system; to determine tributary compliance with the Massachusetts surface water standards; and to provide direction and guidance for DWM management programs and research directives.

The Quabbin Reservoir is currently one of only a handful of large surface water supplies that maintains a filtration waiver from the federally mandated Surface Water Treatment Rule (SWTR). The SWTR in effect requires filtration by every surface water supplier unless strict source water quality criteria and controls can be met. The purpose of the SWTR is to ensure that public water supply systems using surface waters protect against waterborne diseases that may result from exposure to such microorganisms as Giardia lamblia and viruses. Source water quality compliance relies on a surrogate parameter, turbidity, and an indicator organism, coliform bacteria, to provide a relative measure of the sanitary quality of the water.

SWTR Source Quality Criteria

- Coliform Limits: Six-month running average fecal coliform ≤20 CFU/100 mL in 90% of samples.
- Turbidity Limits: Before disinfection, turbidity not to exceed 5 NTU based on sampling at 4-hour intervals.

The Quabbin Reservoir has fully met the SWTR Source Quality criterion since June 1991, thanks in large part to a successful Gull Control Program. Source water fecal coliform bacteria levels are monitored daily by the MDC at Site 201, located on the Chicopee Valley Aqueduct service line prior to disinfection. Historic data from Site 201 over the 1990-1999 period shows that both fecal coliform bacteria and turbidity levels are low averaging 1 colony forming unit per 100 mL (1 CFU/100mL) and 0.3 NTU respectively. 2001 levels were nearly unchanged as fecal coliform bacteria levels averaged less than 1 CFU/100 mL and turbidity levels averaged 0.31 NTU. Fecal coliform bacteria was absent

in 86% of the 414 samples collected and at no time did levels exceed the 20 CFU/100mL standard. Fecal coliform bacteria levels reached a high of 15 CFU/100mL on April 1. Elevated levels were attributed to the presence of high numbers of gulls (around 2000) observed roosting overnight on the reservoir during that week. The next highest fecal coliform level was 6 CFU/100mL detected on April 4. Source water compliance monitoring for turbidity is handled by the MWRA who utilizes an online analyzer for continuous monitoring. However, the MDC performs weekly turbidity analysis at Site 201 to assess system compliance. The MDC measured turbidity levels at their highest at 0.9 NTU on December 3, an apparently isolated event likely related to algae levels. The next highest level was recorded at 0.5 NTU on August 20. Turbidity levels are characteristically stable throughout the year and typically unaffected by storm events.

2001 marked the first full year in which the MDC laboratory assumed responsibility for all microbiological analysis of quality assurance and Department of Environmental Protection (DEP) prescribed compliance samples collected on the Chicopee Valley Aqueduct community service line. The DEP requires bacterial sampling of the Winsor Power Station tap (Site 201) at a minimum of five days per week (total and fecal coliform bacteria) and at the Nash Hill tank (total coliform) at least once per week. Quality assurance samples prescribed by the MWRA include a daily sample from the Ludlow Monitoring Station (total coliform) and samples collected as often as possible from the Nash Hill tank (total coliform). The MDC laboratory analyzed 614 "finished water" CVA samples for total coliform bacteria. Laboratory analysis was performed seven days a week and continued throughout the year.

Provisions of the Massachusetts Beaches Bill and subsequent amendments to Massachusetts Minimum Standards for Bathing Beaches (105 CMR 445.000) went into effect in March 2001. The changes to 105 CMR 445.000 require that Escherichia coli (E. coli) be used exclusively as the indicator bacteria for determining the bacterial acceptability of the bathing beach water. The change reflects EPA's recommendation to transition away from using coliform bacteria as an indicator of sanitary quality because of E. coli's better correlation with the occurrence of swimming –related gastrointestinal disease. As owner and operator of the Comet Pond Beach, the MDC met this new challenge and incorporated the new bacteria into its Beach Monitoring Program. The MDC laboratory performed in-house analysis of E. coli on 33 beach water samples. Fecal coliform bacteria analysis continued to be performed and a side by side comparison of the limited data set showed that the two indicator bacteria correlated well ($R^2 = 0.94$). A formal summary of the Beach Monitoring Program was prepared and submitted to the Department of Public Health and upon request can be made available for review.

This report is supplemented by a collection of in-reservoir nutrient and plankton data found in Appendix C. The baseline data is being collected on a quarterly basis and is coordinated with monthly reservoir sampling conducted between the months of April through December. This work builds on a database that was begun by the MDC in 1998. Laboratory work is being coordinated between the MDC Quabbin and Wachusett laboratories, and, the MWRA Central laboratory. A formal report on results will be published at a later date.

No major changes were made to the core sampling program from previous years but there were several specialized investigations in which the MDC laboratory contributed both significant staff time and laboratory services. Two projects are being spearheaded by the University of Massachusetts at Amherst. The first project launched in April 2001 is Phase IV of the Massachusetts Acid Rain Monitoring (ARM) Project. The ARM project is largely a volunteer effort that aims to collect data on ph, alkalinity, total phosphorous and major ions at a minimum of 150 lakes and ponds located across Massachusetts. Results are used to assess the impacts from acid rain and will build on ten years of data collected between 1983 and 1993. The MDC Quabbin laboratory's contribution to the project included analysis three times per year of ph and alkalinity for up to forty lake and stream samples. The MDC laboratory is not expected to participate in the program in 2002 because of budget constraints. The second project was a University of Massachusetts research project funded by the AWWA Research Federation. The study is attempting to quantify stormwater generated, microbiological loadings from various land uses. Two stations have been selected inside of the Quabbin Reservoir watershed because of their proximity to wildlife populations and location inside a virtually undeveloped sub-watershed. The MDC Quabbin laboratory is contributing by providing microbiological analysis of storm water samples. The MWRA laboratory at Deer Island has also been analyzing nutrient levels. In one December storm event, MDC staff processed thirty-two samples and performed analysis on each for total and fecal coliform bacteria and heterotrophic plate count. Because of the need for many dilutions more than 140 analyses can be expected for each storm event. The MDC will continue to collect and analyze background microbiological data in 2002.

Environmental Quality staff continued to monitor site-specific water quality impacts related to development pressures, wildlife populations and construction activities. Also, beginning in June the MDC began an investigative response to elevated in-reservoir total coliform bacteria levels. Reservoir samples were collected at depth at three stations to examine temporal variations of the total coliform bacteria populations. The effort was successful in generating baseline data on the apparent "bloom" effect that has been observed now for two consecutive years. The 2001 pathogen monitoring program continued to focus on collecting baseline data on the occurrence of Giardia and Cryptosporidium. Water entering the Chicopee Valley Aqueduct prior to disinfection was sampled every two weeks from the Winsor Power Station building tap (Site 201). Of the 24 samples collected and analyzed for Giardia and Cryptosporidium, none of the results were above detection limits that ranged from 0.26 to 1.06 cysts per 100 liters.

Lastly, the tragic events of September 11 changed everyone's life forever, and suddenly priorities at Quabbin Reservoir quickly became shuffled as emerging threats were realized. Along with key security changes, much emphasis was placed on the important role that daily water quality measurements and observations were providing for the protection of the water supply. Environmental Quality Staff increased reservoir monitoring of chemical parameters to a weekly basis and mobilized weekly shoreline surveys of critical reservoir areas. EQ staff efforts were scaled back after December 19 but the reservoir remains under constant guard by the Massachusetts National Guard, State Police and the MDC Rangers.

The Quabbin Reservoir Water Quality Monitoring Program, briefly highlighted above, is a large-scale effort that produces a wealth of valuable information utilized for watershed management and compliance purposes. The purpose of this report is to present Calendar Year (CY) 2001 water quality results from source water monitoring performed on Quabbin Reservoir and its tributaries, including those within the Ware River watershed. Three major sections are presented in this report. The first section is a general description of the system and its hydrological characteristics and draws largely on data collected and maintained by the Quabbin Civil Engineering Section and the U.S. Geological Survey. Data is presented on precipitation, reservoir yield data and stream flows. The next section outlines the current water quality monitoring program with descriptions of sampling locations, frequencies and parameters of study. Physical and chemical data for principal Quabbin Reservoir inlets and outlets are presented in Table 4. Summary data for the Ware River Intake at Shaft 8 is presented in Table 5. Similar data is presented for combined Quabbin Reservoir and Ware River tributaries in Tables 9 and 10. Information on sample site locations is presented in Tables 6 and 7 and Figures 8 and 9. The final section is devoted to a series of specialized studies and investigations. The specialized investigations cover a variety of issues and often last only for a short-term. Figures and tables presented in this report are meant simply to organize the wealth of water quality data generated annually into a meaningful format based on the source supply and its contributing tributaries. Appendix D contains tables of data collected at each individual site and reports each site's yearly minimum, maximum, median and average values.

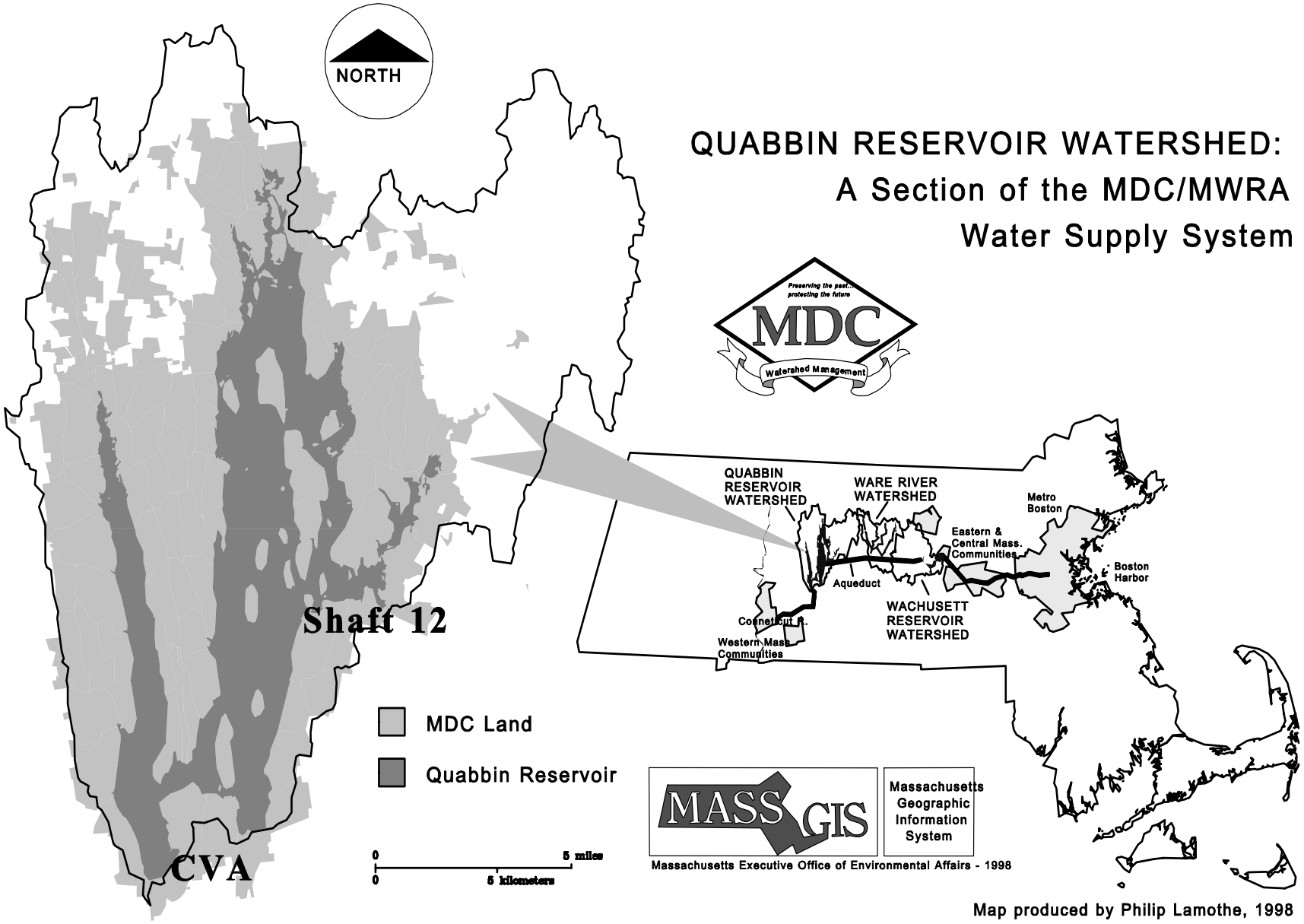
1.0 CHARACTERIZATION OF THE QUABBIN RESERVOIR WATERSHED SYSTEM

Figure 1 shows the Quabbin Reservoir, Ware River and Wachusett Reservoir watershed system that supplies drinking water to Boston and 45 other member communities that make up the MWRA service territory. The largest of the three interconnected sources is Quabbin Reservoir, a 412 billion gallon impoundment of the Swift River located in Central Massachusetts. Quabbin Reservoir transfers to Wachusett Reservoir via the Quabbin Aqueduct Intake at Shaft 12 typically account for more than half of MWRA's system supply. Quabbin Reservoir also supplies a much smaller amount of water directly to three western Massachusetts communities via the Chicopee Valley Aqueduct (CVA). Water is delivered via two, gravity fed aqueduct systems whose intake structures are labeled in Figure 1. The Quabbin Aqueduct intake at Shaft 12 is located along Quabbin Reservoir's eastern shoreline in Hardwick. The CVA intake lies at the base of Winsor Dam in Belchertown. MDC has maintained a SWTR, filtration waiver status for its CVA supply since 1992. A filtration waiver for the Wachusett Reservoir also exists and was upheld under a legal challenge initiated by the federal Environmental Protection Agency. The focus of this report is the Quabbin Reservoir watershed and supplemental supplies from Ware River diversions. Land use characteristics of the contributing watersheds are summarized below.

Quabbin Reservoir watershed is about 19 miles long, 13 miles wide, and contains roughly 120,000 acres. More than 90% of watershed lands are forested and the Metropolitan District Commission owns and controls 53,000 acres (55%) for water supply protection. The majority of non-MDC owned land is maintained as private forest. Developed lands can be characterized as sparsely populated and having limited agricultural sites.

The Ware River watershed is about 11 miles long, 7 miles wide, and contains roughly 62,000 acres. Nearly 75% of the watershed is forested and the Metropolitan District Commission owns and controls 22,000 acres (35%) for water supply protection. The vast majority of private lands are maintained as forests and developed lands consist primarily of low density residential and agricultural sites. Waters from Ware River are diverted into the Quabbin Aqueduct at Shaft 8 in Barre and directed west towards Quabbin via gravity flow. Ware River flows enter the reservoir at Shaft 11A located east of the baffle dams in Hardwick. Diversions are limited to periods when Ware River flows exceed 85 MGD and require DEP approval unless conducted during the allowable diversion period from October 15 to June 15.

No wastewater treatment plant discharges are currently permitted in tributaries to either of the three water supplies. Industrial and commercial sites throughout the three watersheds are limited.


NORTH
QUABBIN RESERVOIR WATERSHED:
A Section of the MDC/MWRA
Water Supply System
Preserving the past... protecting the future
MDC
Watershed Management
QUABBIN RESERVOIR WATERSHED
WARE RIVER WATERSHED
Metro Boston
Eastern & Central Mass. Communities
Boston Harbor
Aqueduct
WACHUSETT RESERVOIR WATERSHED
Connecticut R.
Western Mass Communities
Shaft 12
CVA
MDC Land
Quabbin Reservoir
0 5 miles
0 5 kilometers
MASS GIS
Massachusetts Geographic Information System
Massachusetts Executive Office of Environmental Affairs - 1998
Map produced by Philip Lamothe, 1998

PRECIPITATION

For more than seventy years, the Metropolitan District Commission has collected and maintained weather station data for the primary purpose of determining reservoir yields. Figure 2 illustrates the distribution of precipitation throughout the year and summarizes monthly precipitation totals for records dating back to 1939 for the Belchertown weather station. Annual precipitation totals have averaged 45.80 inches and monthly precipitation totals average between 2.96 and 4.39 inches (months of February and August respectively).

In 2001, the precipitation total of 39.87 inches was nearly six inches below normal and represents nearly a 25% reduction from 2000 totals. Historically, the 2001 rainfall ranks as the twelfth driest on record in the 64 years of recordkeeping at the Belchertown, Massachusetts meteorological station. Monthly precipitation totals were within a normal range of conditions for the months of February, September and December. Notably wet months with totals ranking among the top 20 percent of records kept since 1939 included March, June and August. However, the year will be remembered for the mild to moderate drought conditions that ended the year due in large part to the six months in which totals ranked among the lowest 20 percent of records kept since 1939. The abnormally dry months included January, April, May, July, October and November. October and November were especially dry as totals were only slightly above one inch and both ranked as the fourth driest on record for their respective month. Throughout the year nine storm events equaled or exceeded one inch in a 24 hour period. Three of these storm events occurred inside the month of March. In August intense thunderstorms dumped as much as 4.21 inches of rain in the southern portions of the watershed. Storm totals in this range are on the order of magnitude of one that averages a 10 year return interval. In other words storms of this nature have only a 10% probability of occurring in any given year.

The seasonal (i.e. November 2000 through April 2001) snowfall total of 70.0 inches was significantly higher than the seasonal average of 48.21 inches. On February 5, 22.75 inches of snow had fallen in the watershed region. The 12 hour storm event with snowfall rates up to 2-3 inches per hour set new single storm total records for the region (source: News 22). As late as April 17, snow as deep as 5-10 inches covered the ground throughout the watershed region. Figure 4 (right) produced by the Northeast River Forecast Center, illustrates the extensive "springtime" snow cover.

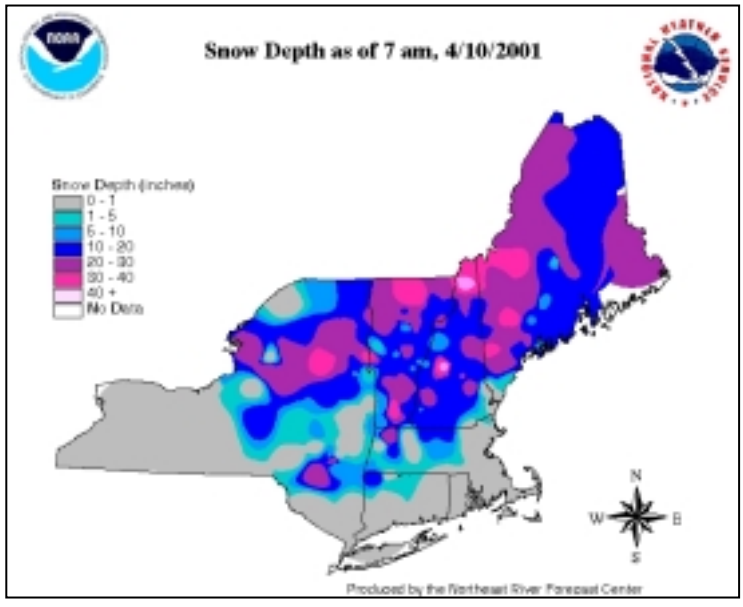
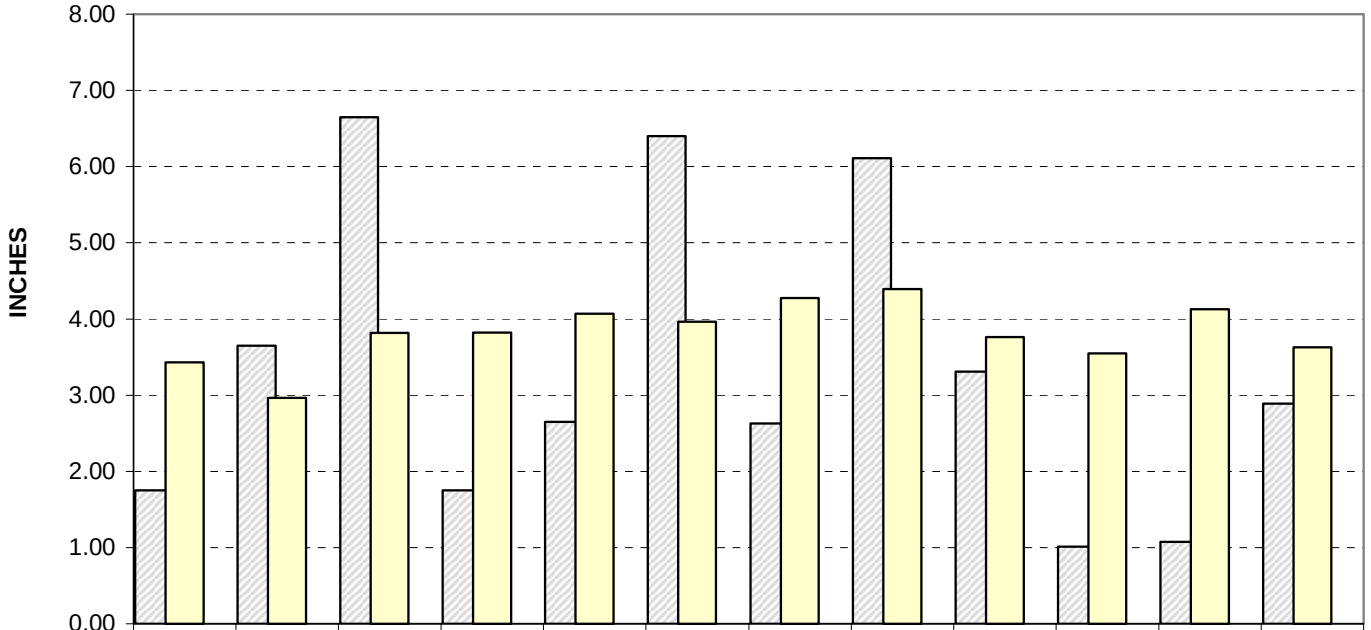


Figure 2

2001 MONTHLY PRECIPITATION VS. 63 YEAR AVERAGE (1939-2001) BELCHERTOWN, MA



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Precipitation (in.)	1.75	3.65	6.65	1.75	2.65	6.40	2.63	6.11	3.31	1.01	1.07	2.89
Departure from Norm (in.)	-1.68	0.69	2.83	-2.07	-1.42	2.44	-1.65	1.72	-0.45	-2.54	-3.06	-0.74
Cumm. Departure (in.)	-1.68	-0.99	1.84	-0.23	-1.65	0.79	-0.86	0.86	0.41	-2.13	-5.19	-5.93
Number of Storms >1.0 in.	0.0	1.0	3.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	1.0
63 Year Average Precip. (in.)	3.43	2.96	3.82	3.82	4.07	3.96	4.28	4.39	3.76	3.55	4.13	3.63
63 Year Minimum	0.70	0.48	0.55	0.87	0.90	1.10	0.84	0.89	0.86	0.56	0.93	0.76
63 Year Maximum	10.21	7.03	7.58	9.11	13.09	9.62	9.45	22.96	11.55	11.08	7.32	8.19
20 Percent Exceedance	4.82	3.84	5.09	5.25	5.42	5.35	5.70	6.04	6.26	5.19	5.73	5.12
80 Percent Exceedance	1.96	2.09	2.48	2.18	2.70	2.47	2.67	1.99	1.87	2.03	2.72	2.26
Snow (in.)	10.0	28.0	20.0									5.0

Source: MDC Civil Engineering Yield Data, 1939-2001

STREAM FLOWS

Through a cooperative agreement with the United States Geological Survey (USGS), five stream gauges are actively being monitored inside the Quabbin Reservoir and Ware River watersheds. Stations include sites on the Ware River in Barre (at intake), Ware River at Barre Falls, East Branch Swift in Hardwick, West Branch Swift in Shutesbury, and the Swift River below Winsor Dam. Locations of the stream gauging stations are depicted in the Figure 3. Found in the appendix of this report are data tables of daily discharges measured by personnel from the U.S. Geological Survey, Water Resources Division.

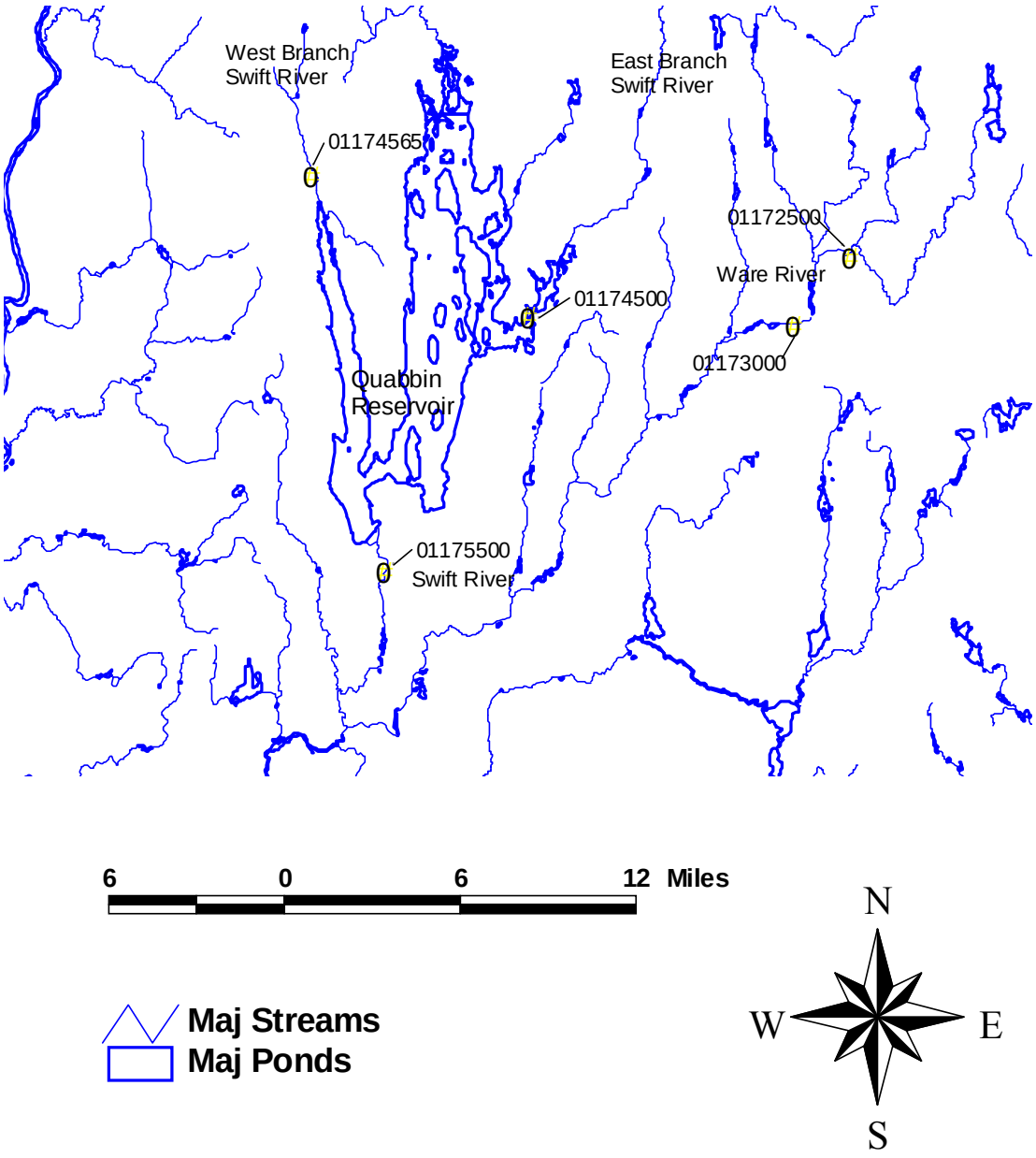
2001 Annual Mean Daily Discharges

Ware River at Intake Works: 86.9 cfs
East Branch Swift River: 46.4 cfs
West Branch Swift River: 21.9 cfs
Swift River at Ware: 76.1 cfs

Runoff for 2001 was highly variable as streams set both record high and record low flows. At or near normal monthly stream discharges were maintained at all stations for the months of January, February, March, June, July, August and September. However, late season snowmelt produced higher than normal steam flows in April for all stations and new record high mean daily flows were set on the Ware River at Shaft 8 beginning on April 17. Also in April, a new record high mean monthly discharge was established on the West Branch Swift River. Lack of precipitation in May created below normal stream flows and throughout the fall months mild drought conditions persisted that produced abnormally low stream flows in October, November and December. New record minimum monthly mean daily stream flows were established both on the East Branch Swift River and the Ware River at Barre Falls for the months of October, November and December. West Branch Swift flows in December also set a new minimum monthly mean discharge. Also, a new record minimum monthly mean daily stream flow was set in May on the Ware River at Barre Falls, just one month after new record high flows were recorded.

On April 10 both the East Branch Swift River and West Branch Swift River experienced peak mean daily flows of 619 cfs and 193 cfs respectively. High flows in April on the West Branch Swift set a new maximum monthly mean discharge at 83.1 cfs. Daily flows in the Ware River at Shaft 8 peaked on April 20 at 1,060 cfs. Flow in the Swift River near Ware is a function of controlled releases from Winsor Dam and spillway discharges. The peak mean daily flow was measured at 191 cfs on June 30 and July 1, at a time when excess reservoir water was spilling and river flows were augmented by roughly 85 mgd diverted through the Winsor Dam bypass. Minimum mean daily flow on the Ware River at Shaft 8 was measured at 0.9 cfs on September 13. Minimum mean daily flow on the West Branch Swift River was measured at 1.7 cfs on September 2. The East Branch Swift River had no measurable flow for a period of 19 days beginning on the last day of August.

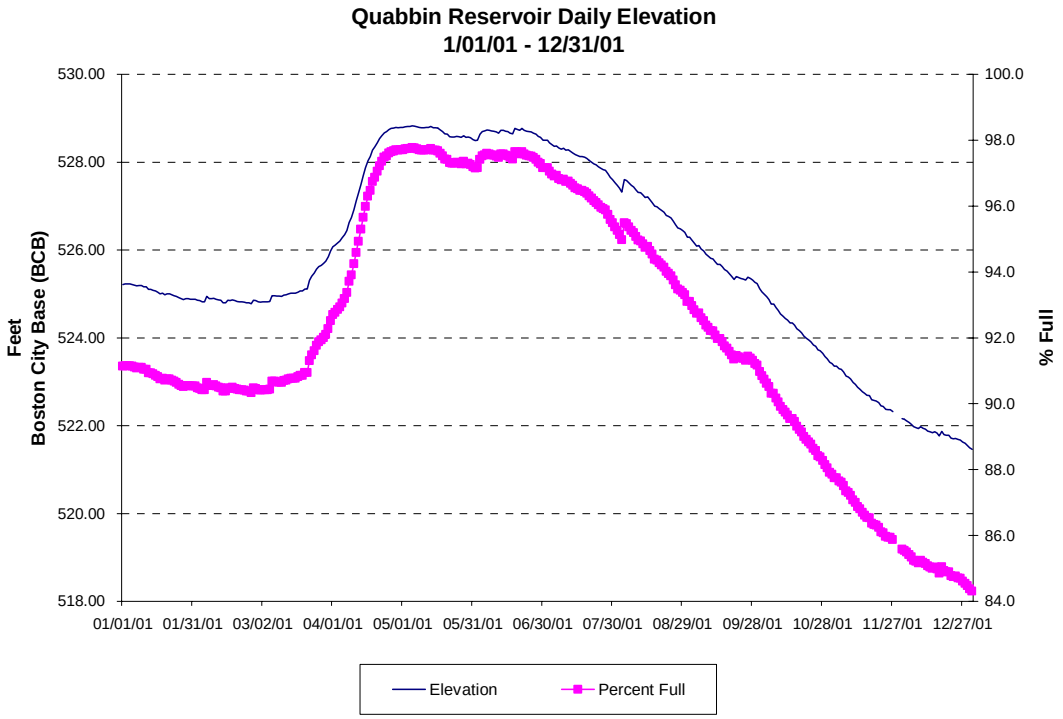
Figure 3. Locations of USGS Stream Gaging Stations Quabbin Reservoir Watershed



Source: Massachusetts Geographic Information System, Data Viewer.

RESERVOIR CONDITIONS

Quabbin Reservoir storage capacity began 2001 at 91.1% and ended at 84.3% full reflective of the mild drought conditions that ended the year. The reservoir delivered on average 9.0 million gallons per day (MGD) to the Chicopee Valley Aqueduct service area over the course of 365 days. During the 294 days that water was released to Wachusett Reservoir, flow entering the Quabbin Aqueduct averaged 212.4 MGD. A total of 2,537.3 million gallons (MG) was discharged over the spillway over the course of 93 days beginning on April 16 and ending July 20. A total of 4,122.7 million gallons of water was diverted from Ware River over the course of eleven days beginning on April 12.



Ice covered the reservoir for an extended period of 61 days beginning on January 23 and ending March 25. The reservoir was partially ice-covered for a period of 91 consecutive days as 100% ice-out did not occur until April 12 and ice started to form on or about January 11. MDC snow surveys were performed on February 7 and March 8 at six watershed stations. Average watershed snow depth was calculated at 21.90 and 26.40 inches respectively. The Northeast River Forecast Center reported snow depth ranging from 5 to 20 inches of snow in north Central and Western Massachusetts on April 10.

Table 1 on the following page presents general statistics on the reservoir and contributing watershed area and compares reservoir conditions over the past three years.

TABLE 1
QUABBIN RESERVOIR FACTS AND FIGURES

FACTS ABOUT THE RESERVOIR		FACTS ABOUT THE WATERSHED	
Capacity	412 Billion Gals	**Watershed Area**	120,000 acres
Surface Area	24,000 acres	**Land Area**	96,000 acres
Length of Shore	118 miles	**MDC Owned Land**	53,000 acres
Maximum Depth	150 feet	**% MDC Owned**	55%[1]
Mean Depth	45 feet	**Forested Lands**	83,235 acres
Surface Elevation	530 feet	**Wetlands**	5,289 acres
Year Construction Completed	1939	**Avg. Reservoir Gain From 1" of Precipitation**	1.6 Billion Gallons

Calendar Year:	2001	2000	1999
2001 Maximum Reservoir Elevation (ft)	528.53 on May 5	528.62 on June 28	528.20 on May 6
2001 Minimum Reservoir Elevation (ft)	521.46 on December 31	522.40 on February 11 & 13	522.41 on December 30
Total Diversions to Wachusett Reservoir	62,447.8 MG (294 days: 212.4 MGD)	42,708.7 MG (233 days: 183.3 MGD)	59,511.8 MG (251 days: 237.1 MGD)
Total Diversions to CVA	3,296.7 MG (365 days: 9.0 MGD)	2,816.4 MG (365 days: 7.69 MGD)	3,242.5 MG (365 days: 8.9 MGD)
Ware River Transfers	4,122.7 MG (11 days: 4/12-4/22)	603.8 MG (4 days: 3/21-3/24 & 3/27-3/28)	NONE
Spillway Discharges	2,537.3 MG (93 days: 4/16-7/20)	474.6 MG (44 days: 6/11-7/19 & 8/11-8/17)	70.1 MG (34 days: 4/9-5/12)
Total Diversions to Swift River	18,334.2 MG	9,324 MG	13,624.8 MG
Reservoir Ice Cover	≈100% cover: January 23 through March 25 (61 days).	100% cover: January 24 through March 12 (47 days).	Full reservoir ice cover not obtained.

Notes: Source: MDC Civil Engineering Yield Data, 2001

[1]Percentage excludes reservoir surface area in calculation.

2.0 WATER QUALITY MONITORING PROGRAM

The first systematic water quality investigations of the Quabbin Reservoir watershed occurred in the mid 1930's under the guidance of the Metropolitan District Water Supply Commission. As predecessor to the MDC they established the first records of turbidity, color, dissolved oxygen, pH, alkalinity, hardness, and bacteria. To this day the MDC continues a program that has seen little change over the 64 year period since the original construction of the MDC Quabbin laboratory.

The current sampling program focuses on operational aspects, watershed protection functions, including threat identification and enforcement, and compliance monitoring to satisfy state and federal requirements. The program is comprised of thirty-six sampling stations located on twenty streams, seven ponds and five reservoir stations. The stations are regularly monitored for thirteen physiochemical and biological parameters. In CY 2001, the number of samples collected by the MDC laboratory for in-house analysis more than doubled last year's total of 1,540. Of the 3,252 samples collected in 2001; 2,257 were collected for bacteriological analysis and 995 samples were collected for chemical analysis. More than 13,000 individual analyses were performed on these samples; 4,160 were physiochemical measurements taken in the field, 5,398 were physiochemical analyses performed at Quabbin laboratory, and 3,673 were bacterial analyses also performed at the Quabbin laboratory. An additional thirty samples were sent to outside laboratories for specialized analysis.

Table 2 below lists Quabbin laboratory monitoring parameters and their methods of analysis; generally according to Standard Methods for the Examination of Water and Wastewater, 20th Edition. The laboratory maintains water quality records on permanent bound books and in digital format in a Mircosoft Access database. Quality control records are maintained on permanent bound books.

Table 2. QUABBIN LABORATORY: ANALYTICAL AND FIELD METHODS

PARAMETER	STANDARD METHOD
Turbidity	SM 2130 B
pH	SM 4500-H Hydrolab Data Sonde 4a, Orion 811 meter
Alkalinity	SM 2320 B (low level)
Chloride	SM 4500-Cl^- C.Mercuric Nitrate Method
Hardness	SM 2340 C
Color	SM 2120 B
Conductivity	HACH DREL/5 meter Hydrolab Data Sonde 4a
Temperature	YSI Model 57 DO Meter Hydrolab Data Sonde 4a
Dissolved Oxygen	YSI Model 57 DO Meter Hydrolab Data Sonde 4a
Iron	HACH DR/3 Spectrophotometer
Total Coliform	SM 9222B
Fecal Coliform	SM 9222
E. Coli	EPA Modified mTEC Agar Method

2.1 SOURCE WATER QUALITY MONITORING

The primary objectives of source water quality monitoring are the protection of public health, compliance with state and federal drinking water regulations and quality control. Table 3 lists the ten source water monitoring stations that include sites on the reservoir and at several locations along the aqueduct systems. Sampling frequency varies from site to site and ranges from as frequent as twice-daily to as infrequent as once a month.

Primary sites located on the Chicopee Valley Aqueduct are sampled by the MWRA and MDC at a minimum of once daily for both quality assurance and compliance monitoring purposes. Primary sites include: the Winsor Power Station (201), a building tap located at the head of the CVA service line prior to disinfection; the Ludlow Monitoring Station, a chlorinated sample taken by the MWRA from the CVA approximately nine miles downstream of the reservoir; and, Nash Hill a chlorinated sample taken by the MWRA from a tap off of the twenty-five million gallon, covered storage facility. The Chicopee Station located on the CVA service line downstream of Nash Hill is sampled infrequently by the MWRA and only serves as an alternate to the Nash Hill site in the event of a frozen or inaccessible tap. In CY 2001, the MDC laboratory assumed the responsibility for all coliform bacteria testing at these stations (a duty that started in 2000). In total, 1,028 samples were collected from the CVA monitoring stations and analyzed for coliform bacteria. At Site 201, fecal coliform bacteria monitoring is required for compliance with Source Quality Criteria determinations stipulated under the SWTR of 1989. Fecal coliform bacteria was absent in 86% of the samples collected (356 of 414) and concentrations averaged less than 1 Colony Forming Unit (CFU) per 100 milliliters (mL). The highest concentration reached was 15 CFU per 100 mL during a time when up to 2,000 gulls were actively roosting on the reservoir overnight. It should be noted that fecal coliform bacteria monitoring at Site 201 is conducted more frequently (twice daily) during active phases of the G*ull Control Program.* Total coliform bacteria was also measured daily in samples collected from Site 201. Similar to what was observed in CY 2000, total coliform levels at Site 201 (Figure 7) became elevated in early July and did not return to historic low levels until early November. Total coliform bacteria levels during this time period averaged 369 CFU per 100mL and contrasts sharply with the historic median level of 3 CFU per 100mL measured over the 1990 to 1999 period. The highest concentration reached was 5,100 CFU per 100 mL on September 18. Reservoir total coliform bacteria levels are discussed further in this report under special investigations. Total coliform bacteria was present only once in 614 "finished" water samples collected from MWRA quality assurance monitoring stations located on the CVA aqueduct. The positive result collected on July 2 from Nash Hill confirmed positive for total coliform but was negative for E. Coli bacteria.

Physiochemical parameters are also monitored weekly at Site 201 and these include temperature, dissolved oxygen, turbidity, pH, alkalinity and specific conductance. Color, hardness, chloride and iron measurements are performed quarterly. Giardia and Cryptosporidium samples were also collected bi-monthly (happening once every two weeks). A total of twenty-four samples were collected and sent

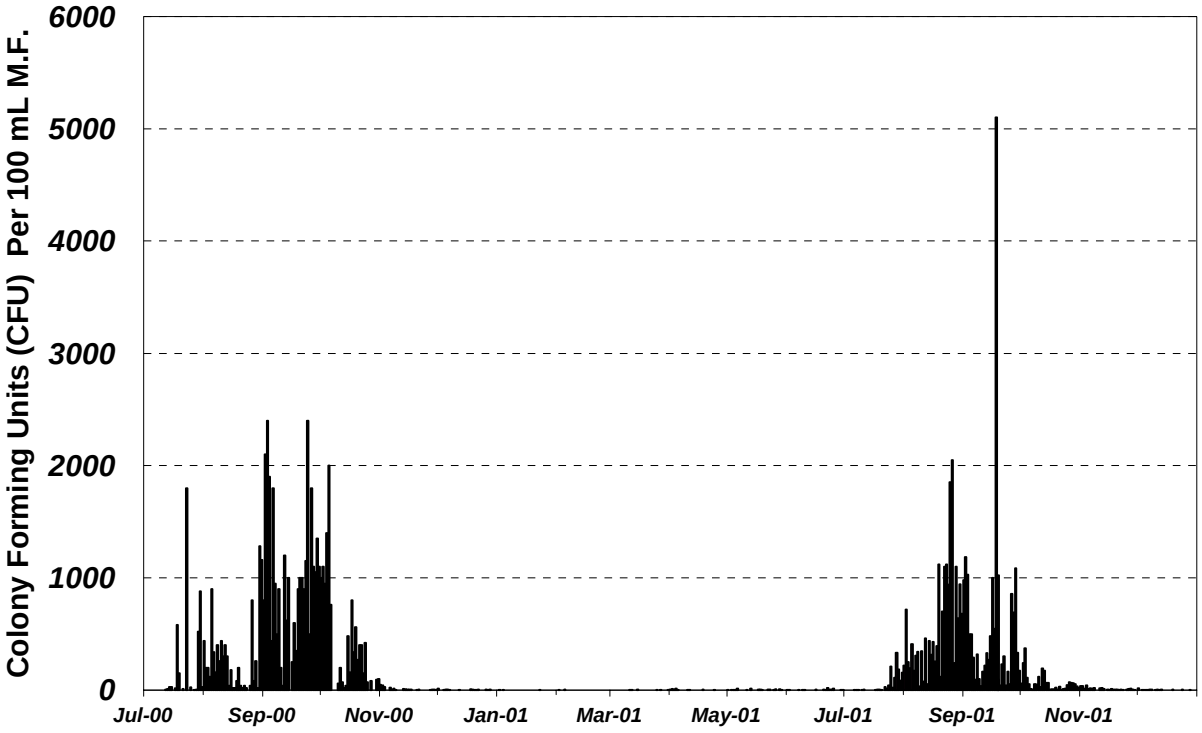
to the Erie County Water Authority of New York for analysis. Baseline data on the presence of these microorganisms builds on a database that was begun in 1994. Results of this sampling program are included in the Special Investigations section of this report.

Samples are collected weekly from the shore at Shaft 12 to characterize the quality of water entering the Quabbin Aqueduct. Source water quality monitoring stipulated under the SWTR is not required at this location because Quabbin Reservoir water "daylights" to Wachusett Reservoir before completing its 70 mile journey to the metropolitan Boston area. The same parameters monitored at Site 201 are monitored at Shaft 12 (Site 206) with the only difference being that coliform bacteria monitoring is conducted on a weekly basis. Table 1 presents a side-by-side summary of water quality data from the two reservoir source water stations. Results show there to be little variation between the two stations and little fluctuation of parameter levels throughout the year. Also noteworthy are the significant (50% and 350%) increases in 2001 median total coliform bacteria levels as compared with levels measured between the 1990 to 1999 period.

Physiochemical and bacterial monitoring at the intake works structure in Barre at Shaft 8 is performed biweekly (happening once every two weeks). Like Shaft 12, source water quality sampling at this location is not required under state and federal regulations but is performed for assessment purposes. Diversions from Ware River to Quabbin Reservoir are permitted without DEP approval from October 15 to June 15 and are limited to periods when Ware River flows exceed 85 MGD. Table 2 exhibits the notable improvement in water quality observed during the allowable diversion period. For example, during the allowable diversion period fecal coliform bacteria levels averaged 11 CFU per 100 mL and turbidity levels equaled or exceeded 1 NTU in 8 of 17 grab samples. At no time was there a turbidity level recorded above 5 NTU. In comparison, during the non-diversion period fecal coliform bacteria averaged 178 colonies per 100 mL and turbidity equaled or exceeded 1 NTU in 9 of 9 grab samples. The Quabbin Aqueduct outfall at Shaft 11A, located on the reservoir shoreline in Hardwick, is only monitored when Ware River flows are being discharged to Quabbin Reservoir. On April 17, the station was sampled only once during the eleven day diversion period.

MDC staff monitor temporal variations of reservoir water quality at stations established inside of three distinct reservoir basins: the West Arm at Winsor Dam; the Central Basin at Shaft 12; and, the East Arm at Den Hill. The three routine reservoir sites were monitored monthly between March and December. In 2001, a fourth site "3A" was added to provide additional data on the occurrence of total coliform bacteria within the reservoir. Beginning on June 6 and ending December 19, staff collected three bacteria samples at depth each week from the Central and West Arm reservoir stations. Reservoir monitoring results are discussed further in Section 2.3 of this report.

Winsor Power Station (201) - Total Coliform Bacteria Occurrence 7/10/2000 Through 12/31/2001



Source: MDC Quabbin Laboratory , 2001

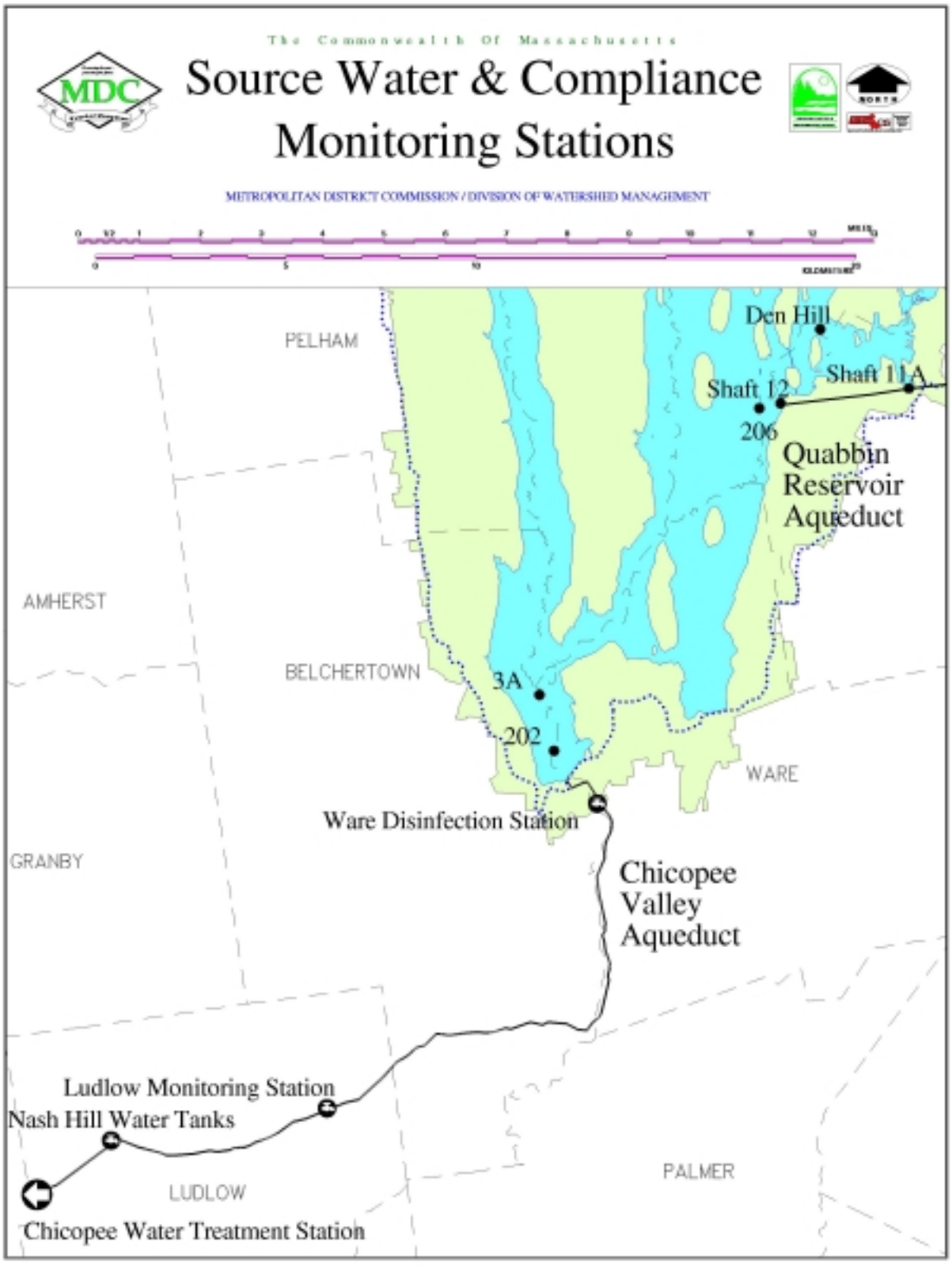

The Commonwealth Of Massachusetts
MDC
Source Water & Compliance
Monitoring Stations
METROPOLITAN DISTRICT COMMISSION / DIVISION OF WATERSHED MANAGEMENT
PELHAM
Den Hill
Shaft 11A
Shaft 12
206
Quabbin
Reservoir
Aqueduct
AMHERST
BELCHERTOWN
3A
202
WARE
Ware Disinfection Station
GRANBY
Chicopee
Valley
Aqueduct
Ludlow Monitoring Station
Nash Hill Water Tanks
PALMER
LUDLOW
Chicopee Water Treatment Station

Table 3 – 2001 Source Water Compliance and Quality Assurance Sample Stations			
Station	Location	Universal Transverse Mercator (UTM) Coordinates*	Frequency
Ludlow Monitoring Station (LMS)	Chicopee Valley Aqueduct, Route 21 Ludlow.	----	Daily – AM collection seven days a week.
Nash Hill	Chicopee Valley Aqueduct, storage facility.	----	Daily – Constitutes AM collection Monday through Friday or as often as possible.
Chicopee	Chicopee Valley Aqueduct, Chicopee Water Treatment Plant.	----	Site serves as an alternate to Nash Hill and thus is sampled infrequently.
(201) Winsor Power Station	Building tap located on Chicopee Valley Aqueduct prior to disinfection.	130448.40, 892497.60	Daily – Constitutes AM collection Monday through Thursday. Sampling is increased with an additional PM sample collected seven days a week during phases of the *Gull Control Program.*
(206) Shaft 12 shoreline	Shoreline beside Shaft 12 intake building	135866.90, 902601.20	Weekly
Shaft 11A	Quabbin Aqueduct outlet on Quabbin Reservoir shoreline, east of baffle dams.	139244.40, 902997.10	Weekly during Ware River diversions.
QR01/202 Winsor Dam	Quabbin Reservoir west arm off of Winsor Dam	129908.40, 893432.60	Monthly – April thru December
"3A"	Quabbin Reservoir west arm centrally located inside Winsor Basin	4686649, 718051	Weekly**
QR06/206 Shaft 12	Quabbin Reservoir at site of old Quabbin Lake, off shore of Shaft 12	135308.80, 902472.80	Monthly – April thru December
QR10/Den Hill	Quabbin Reservoir eastern basin North of Den Hill	136910.90, 904555.50	Monthly – April thru December

UTM coordinates referenced using NAD 27.

****In 2001, site was added to monitor bacteria levels weekly during the months of June through December.**

Table 4 – 2001 Quabbin Reservoir Water Quality Data: MDC Sample Stations 201 & 206

	Parameter	Observed Range of Values					Massachusetts Water Quality Standard
		Min.	Max.	Avg.	Median[1]		
					CY 2001	% Change vs. Historic	
Site 201 Winsor Power Station	***Biological***						
	Total Coliform Bacteria	0	5100	117	3	+50%	No Standard
	Fecal Coliform Bacteria	0	15	<1	0	NC	† mean ≤20
	Physical Characteristics						
	Turbidity (NTU)	0.2	0.9	0.3	0.3	NC	See narrative text.
	Color (units)	5	5	5	5	NC	†† 15
	Dissolved Oxygen (mg/L)	8.2	15.0	11.2	11.4	+3.6%	† min. 6.0 mg/L
	Temperature (°C)	2	18°C	8.9°C	10°C	NC	† max. ≤20°C
	pH (units)	6.5	6.8	6.6	6.6	+1.5%	† 6.5-8.3
	Alkalinity (mg/L as CaCO3)	3.9	4.6	4.2	4.2	+2.4%	See narrative text.
	Hardness (mg/L as $CaCO_3$)	7.4	7.9	7.6	7.55	-19.7%	See narrative text.
Site 206 Shaft 12 Shore	***Biological***						
	Total Coliform	0	1414	135	18	+350%	No Standard
	Fecal Coliform	0	4	<1	0	NC	† mean ≤20
	Physical Characteristics						
	Turbidity (NTU)	0.2	0.4	0.3	0.3	NC	See narrative text.
	Color (units)	5	5	5	5	NC	†† 15
	Dissolved Oxygen (mg/L)	7.7	14.1	10.4	10.1	-1.9%	† min. 6.0 mg/L
	Temperature (°C)	1	26	12.2	11	NC	† max. ≤20°C
	pH (units)	5.2	6.8	6.7	6.7	+1.5%	† 6.5-8.3
	Alkalinity (mg/L as CaCO3)	1.2	4.4	4.1	4.2	NC	See narrative text.
	Hardness (mg/L as $CaCO_3$)	7.2	8.1	7.6	7.5	-21.9%	See narrative text.

Notes: † *MA Inland Class A Water Body Standards* - Minimum criteria required for surface waters to sustain and protect them from the degradation of their designated use(s).

†† *MA Secondary Drinking Water Standards* - These standards and meant only to serve as a guide, the parameters are not known to cause a health risk but may affect the taste, odor and color of water.

[1]Historic median values based on MDC Quabbin Laboratory records from 1990 through 1999. "NC" refers to "No Change".

1.) Coliform concentration reported as number of colony forming units per 100 mL. 2.) PPM (Parts per million) - 1 PPM = 0.9997 mg/L.

Table 5 – 2001 Ware River Water Quality Data: Shaft 8

	Parameter	Observed Range of Values					Massachusetts Water Quality Standard
		Min.	Max.	Avg.	Median[1]		
					CY 2001	% Change vs. Historic	
2001 DATA IN WHOLE	***Biological and Physical Characteristics***						
	Total Coliform Bacteria	53	4000	498	235	+327%	No Standard
	Fecal Coliform Bacteria	0	860	69	10	NC	† mean ≤20
	Turbidity (NTU)	0.6	4.0	1.8	1.8	+125%	See narrative text.
	Color (units)	45	100	75	78	+20%	†† 15
	Dissolved Oxygen (mg/L)	7.8	14.0	10.8	10.1	-5%	† min. 6.0 mg/L
	Temperature (°C)	0°C	22°C	10.4°C	10.5°C	-5%	† max. ≤20°C
	pH (units)	5.8	6.6	6.3	6.4	+2%	† 6.5-8.3
	Alkalinity (mg/L as CaCO3)	2.7	9.3	5.9	5.9	+25%	See narrative text.
	Specific Conductance (micromhos per cm)	50	130	87	88	+42%	See narrative text.
DURING ALLOWABLE DIVERSION PERIOD OCT 15 THRU JUN 15	***Biological and Physical Characteristics***						
	Total Coliform Bacteria	53	1300	239	157	+376%	No Standard
	Fecal Coliform Bacteria	0	104	11	2	-33%	† mean ≤20
	Turbidity (NTU)	0.6	2.3	1.3	0.9	+50%	See narrative text.
	Color (units)	45	85	67	70	+27%	†† 15
	Dissolved Oxygen (mg/L)	90%	104%	94%	93%		† min. 6.0 mg/L
	Temperature (°C)	0°C	18°C	5.8°C	3.0°C	-25%	† max. ≤20°C
	pH (units)	5.8	6.6	6.3	6.3	+2%	† 6.5-8.3
	Alkalinity (mg/L as CaCO3)	2.7	7.1	5.4	5.6	+37%	See narrative text.
	Specific Conductance (micromhos per cm)	62	102	82	85	+42%	See narrative text.

Notes:

† *MA Inland Class A Water Body Standards* - Minimum standard for surface waters to sustain and protect them from the degradation of their designated use(s).

†† *MA Secondary Drinking Water Standards* - These standards are meant only to serve as a guide, the parameters are not known to cause a health risk but may affect the taste, odor and color of water.

1.) Coliform bacteria concentration reported as number of colony forming units (CFU) per 100 mL.

2.) [1]Historic median values based on 1990 thru 1999 MDC Quabbin Laboratory records. "NC" refers to "No Change". Percent rounded to nearest whole number

2.2 TRIBUTARY WATER QUALITY MONITORING

Tributary water quality monitoring is used as a tool of the watershed management program to assist with identifying subbasins that may require special attention, enforcement actions, and to track overall trends in water quality. Tables 6 and 7 list the twelve Quabbin Reservoir tributaries and seventeen Ware River tributary stations that comprise the tributary monitoring network. The subwatershed areas and land use characteristics are also included for each sampling station. Sampling station locations are depicted in Figures 8 and 9. Each station is sampled biweekly (happening once every two weeks) and sampling runs are alternated between the two watersheds. Samples are collected at the start of each work week regardless of weather conditions thereby providing a good representation of various flow conditions and pollutant loadings. No changes in sampling frequency or locations were made in CY 2001.

Tributary water samples are analyzed at the MDC Quabbin laboratory for total and fecal coliform bacteria, alkalinity, pH, specific conductance and turbidity. Analysis is also performed quarterly for color, chloride, hardness and iron. Water samples are collected using grab sampling techniques. Temperature and dissolved oxygen are determined in the field using a YSI Model 57 dissolved oxygen meter. Water quality data for individual sample stations can be found in Appendix D of this report. Tables 9 and 10 list on a watershed scale, the parameters monitored with the range of minimum and maximum, average and median concentrations. Provided below is a brief description of monitoring parameters and their significance to tributary water quality. Information in this section was referenced from the Massachusetts Surface Water Quality Standards, Standard Methods for the Examination of Water and Wastewater, 20th Ed., Principles of Water Quality (1984) and USEPA's 1986 Quality Criteria for Water.

Total Coliform Bacteria

Total coliform organisms are the umbrella group of bacteria utilized in the water supply field as an indicator of sanitary quality. The total coliform organism in itself is not pathogenic and is native to soil and decaying vegetation, making it ubiquitous in nature. Others (i.e. Geldreich, 1968) have concluded little sanitary significance of environmental monitoring for these organisms citing the fact that the total coliform group is comprised mainly of the aerogenes group that is of non-fecal origin and ubiquitous in nature. Moreover, there has been much debate as to whether or not total coliform organisms can multiply inside the stream environment (Streeter, 1934), casting further doubt on the qualitative assessment of the numbers. Nevertheless, the continued reliance upon the total coliform group for regulatory compliance in finished water shows its utility in assessing the efficiency of water quality treatment operations and distribution system integrity. In-stream density levels of total coliform bacteria ranged from 2 to 10,000 CFU per 100 mL. Another point worth noting is the fact that as group median total coliform concentrations were 57% higher among the characteristically "pristine" Quabbin Reservoir tributaries than those of the Ware River tributaries.

Fecal Coliform Bacteria

Fecal coliform bacteria are used as possible indicators of fecal matter contamination because they are normal inhabitants of the intestinal tract of man and other animals. Levels can vary greatly depending upon pollutant inputs, stream temperatures, precipitation inputs and stream flows. Geldreich and Kenner (1969) reported bacterial densities (CFU per gram of feces shed) for cows and humans to be in the range of 230,000 to 13,000,000 respectively. The Massachusetts Class A, inland water standard for fecal coliform is an arithmetic mean of less than or equal to 20 CFU/100mL, and, no more than 10% of representative samples shall exceed 100/100mL. For this report, tributaries were ranked by weighting equally six statistical categories (Table 6 below) and assigning scores of 1 to 5 to those sites among the top five in each category. The scores were summed and sites with the highest scores (representative of

Table 6 - CY 2001 Quabbin Reservoir and Ware River Tributaries
A Weighted Ranking (Top Ten) of Fecal Coliform Bacteria Loading

Tributary	Site #	Drainage Area (sq miles)	Weighted Rank[1]	Fecal Coliform Colonies Per 100 mL M.F.							
				Median	Average	Std. Dev	Geometric Mean	Wet Geo. Mean	Dry Geo. Mean	%≥20	%≥100
Mill Brook @ Charnock Hill Road	***121***	3.48	1	17	66.1	151.3	14.6	168	16	47.83%	13.04%
Ware River @ Barre Falls Dam	***105***	22.0	2	24.5	41.4	41.2	24.8	101	24	56.25%	12.50%
Ware River @ Shaft 8		96.5	3	9.5	68.7	175.8	13.6	37	21	42.3%	15.38%
Queen Lake @Rd.Culvert	***111***	2.3	4	22	40.4	46.6	26.5	39	44	60.0%	8.0%
Longmeadow Brook	***109***	12.24	5	10	77.2	226.6	13.7	102	9	20.0%	6.67%
East Branch Ware @ New Boston	***108***	96.5	6	9.5	64.8	160.0	13.6	104	15	34.62%	15.38%
Canesto & Natty Brook	***104***	12.7	7	10	57.0	127.0	18.3	115	20	26.92%	11.54%
East Br. of Swift River @ Rt. 32A	***216***	30.3	8	13	16.5	17.2	9.9	15	9	26.92%	0.0%
Middle Br. of Swift River @ Gate 30	***213***	9.14	9	8	25.1	36.0	12.3	21	17	40.0%	4.0%
Hop Brook @ Mouth	***212-X***	5.43	10	11	21.6	28.0	8.9	61	6	33.33%	4.76%

Source: MDC Quabbin Laboratory Records.
[1]The weighted rank is the order (from highest to lowest) of results from a cumulative score assigned to each site based on its ranking amongst six of the eight statistical categories shown above.

the highest concentrations) were the Mill Brook, Ware River at Barre Falls, and Ware River at Shaft 8. The East Branch Swift River ranks highest among Quabbin Reservoir and eighth highest overall. Table 6 also shows that at 6 of 10 sites listed, fecal coliform data collected when preceded by "wet" conditions had geometric means more than four times higher than levels under "dry" conditions. For purposes of this report, conditions were classified as "wet" when rainfall exceeded ½ inch in the 24 hours prior to sampling or if cumulatively rainfall exceeded 1-inch in the three days prior to sample collection. Only at Queen Lake was the "dry" geometric mean higher than the "wet". Factors that could help to explain this phenomena or the lack of variation between wet and dry conditions may be the proximity of the fecal coliform source, the origin of the fecal coliform (on the land verses in the water), and the dilution effects of the waterbody. Queen Lake bacteria levels were also above normal historic levels as the limit of 20 CFU per 100 mL was exceeded in 60% of the samples. During the 1990 to 1999 period this same percentage was roughly 27%. During CY 2000, the apparent problems at Queen Lake were investigated a possible source was found relating to the frequent use of an upstream fire pond by geese.

Physical and Chemical Characteristics

% Wetlands

The percent wetland cover was estimated using land use classification data obtained from the MDC/MWRA Landuse Program, which interpreted Spring 1992-93 aerial photography. Several researchers that include Surballe (1992) and Lent et. al. (1998) have illustrated the significance of these land use types on the effects of overall composition of water quality in the Quabbin Reservoir watershed. Most recently, Garvey et al (2000) alluded to the statistical significance of east versus west gradients observed in tributary concentrations of total organic carbon, UV absorbance, THMFP, and the nutrient nitrogen and phosphorous. The observed gradient was explained by echoing previous findings relating the significance of wetland composition in stream chemistry.

Turbidity

Turbidity is the relative measure of the amount of light refracting and absorbing particles suspended in the water column. Turbidity is used as an indicator of water aesthetics and as a relative measure of the water's productivity. Excessive turbidity can interfere with treatment efficiency and may be harmful to aquatic species. The drinking water standard is 5 NTU for source water and 1 NTU for finished water. The highest value measured at 7.3 NTU was detected on August 13 inside Longmeadow Brook. Median values among Quabbin Reservoir and Ware River tributaries were 0.6 and 0.8 NTU respectively.

Color

Particulate matter such as decaying organics and certain inorganic materials causes color. Color is an important characteristic because it is an indication of humic content and, therefore, of dissolved organics. Organic compounds are a concern because there is the potential of forming carcinogenic

compounds when reacted with chlorine disinfectant. In 2001, the highest levels were detected in quarterly sampling during the summer months. Tributaries with the highest measurements included Longmeadow Brook (240 TCU) and Natty Pond Brook (200 TCU). Among the Quabbin Reservoir tributaries the West Branch Fever Brook had the highest reading at 85 TCU.

Dissolved Oxygen

Aquatic life depends on oxygen dissolved in water for its survival. Oxygen levels are depleted through the oxygen requirements of aquatic life, the decomposition of organic matter and the introduction of foreign oxygen-demanding substances. Stream flow, turbulence, depth and other physical characteristics of the stream principally drive reaeration. The Massachusetts Class A, inland water standard is a minimum of 6.0 mg/L for cold water fisheries. Higher life forms require a minimum of about 2 mg/L of dissolved oxygen and game fish typically require at least 4 mg/L. Median oxygen levels were lowest in Longmeadow Brook (3.8 mg/L), Natty Pond Brook (6.0 mg/L) and the West Branch Ware River (7.8 mg/L).

Temperature

In 2001, stream temperatures ranged from 0 to 28 degrees Celsius among all tributaries combined. The Massachusetts Class A, inland water standard for a cold-water fishery is a maximum of 20°C.

pH

Hydrogen ion activity (pH) is the measure of the water's reactive characteristics. A drop in pH by one unit represents a ten-fold increase in acidity. The lower the pH the more likely the water will dissolve metals and other substances. A value of 7 indicates neutral water. In the environment, pH is also an important factor in the solubility of persistent heavy metals such as mercury. At pH levels below 6, soluble methyl mercury remains incorporated in the water system and can be more readily accumulated in the tissue of living organisms. The standard specified for Massachusetts Class A, inland water ranges from 6.5 to 8.3. In 2001, Quabbin Reservoir watershed tributary pH levels ranged from 5.1 to 7.5.

Alkalinity

Alkalinity is a relative measure of water's ability to neutralize acidic inputs, and thus is a measure of a waterbodies defense against acidification. The Massachusetts Acid Rain Monitoring project utilizes alkalinity to categorize and rank sensitivity of waters to impacts from acid rain. Sensitivity criteria range from 0 to 20 mg/L of alkalinity with zero categorized as acidified and 10-20 as sensitive. Among the tributaries more than half (57%) fall under the endangered category and roughly one-third (36%) meet the highly sensitive criteria. Gates Brook is the only tributary that falls under the critical category, where alkalinity falls in the range of zero to 2 mg/L as $CaCO_3$.

Hardness

Hardness is principally an indirect measure of the calcium and magnesium ions present in water. In general, water containing less than 50 mg/L as CaCO3 is considered soft and corrosive. In

conventional water treatment, hard water has been shown to play a significant role in preventing the leaching of potentially toxic metal ions such as lead, cadmium and zinc from bounded, insoluble complexes.

Specific Conductance

Conductance is principally used as an indicator of the amount of dissolved minerals within the water. Specific electrical conductance is the measure of the ability of water to conduct an electrical current, which is dependent on the concentration and availability of mineral ions. Elevated levels may be indicative of contamination from road salting, septic system effluent, stormwater discharges or agricultural runoff. Soil type will also have an impact on ion leaching which may help to explain variability among "pristine" sources. In 2001, tributaries in the eastern drainages (and Hop Brook) saw elevated conductance levels persist throughout the year. Using percent exceedances and the benchmark of 75 micromhos per centimeter, the 2001 data was compared to historic trends established over the 1990 to 1999 period. The comparison shows percent exceedance in 2001 increased significantly as more than half of the sites experienced a five-fold increase over historic results. The greatest change was nearly a thirteen-fold increase. This widespread phenomena suggests that environmental factors such as the drier than normal year (and subsequent higher contribution of baseflows) and the extended winter (and road salting) likely contributed to elevated levels. .

Inorganic Compounds

Iron (Fe)

Iron is a natural element found in rocks, soil and used widely in steel products and in water supply piping. Iron is generally found in natural water bodies at concentrations below 0.5 mg/L. Concentrations greater than 0.1 mg/L can precipitate after exposure to the air, causing staining and objectionable tastes.

Chlorides

The secondary drinking water standard for chloride is 250 mg/L to avoid brackish tastes. Salt used for highway de-icing is typically the principal source of surface and groundwater contamination. Other sources include sedimentary rocks and waste discharges from hard water softener units. The highest levels were recorded in November up to 55.5 mg/L.

Table 7

Quabbin Reservoir Tributaries: 2001 Sampling Stations

Tributary	Sample Site #	*Sample Frequency*[1]	*Basin Characteristics*		
			Drainage Area (sq. miles)[2]	% Wetland Coverage[3]	% MDC Owned Land[4]
East Br. of Swift River @ Rt. 32A	216	BW	30.3	10.4%	1.7%
West Br. of Swift River @ Rt. 202	211	BW	12.4	3.4%	33.0%
Middle Br. of Swift River @ Gate #30	213	BW	9.14	8.1%	22.7%
East Br. of Fever Brook @ West Road	215	BW	4.15	11.5%	12.3%
West Br. of Fever Brook @ Women's Fed.	215A	BW	2.69	8.9%	18.4%
Hop Brook @ mouth	212-X	BW	5.43	2.7%	44.8%
Hop Brook @ Gate 22	212	BW	4.52	2.5%	32.0%
Rand Brook @ Rt. 32A	216B	BW	2.42	9.9%	22.7%
Atherton Brook @Rt. 202	211A	BW	1.83	3.2%	36.0%
Cadwell Creek @ mouth	211BX	BW	2.59	3.3%	98.0%
Gates Brook @ mouth	Gates	BW	0.93	3.2%	100.0%
Boat Cove Brook @ mouth	BC	BW	0.15	<<1%	100.0%

Notes:
[1]BW = biweekly meaning happening once every two weeks. Prior to May 1990 tributaries were monitored on a weekly basis.
[2]Source: Massachusetts Geographic Information System, Executive Office of Environmental Affairs. Latest revision 3/90.
[3]Source: DEP Wetland Conservancy Program (interpreted from 1:12000 Spring 1992-93 photos, latest revision 4/96).
[4]Source: Automated by Massachusetts Geographic Information System & MDC, latest revision 6/97.

QUABBIN RESERVOIR WATERSHED:
2001 Water Quality Sample Sites

Metropolitan District Commission −Division of Watershed Management

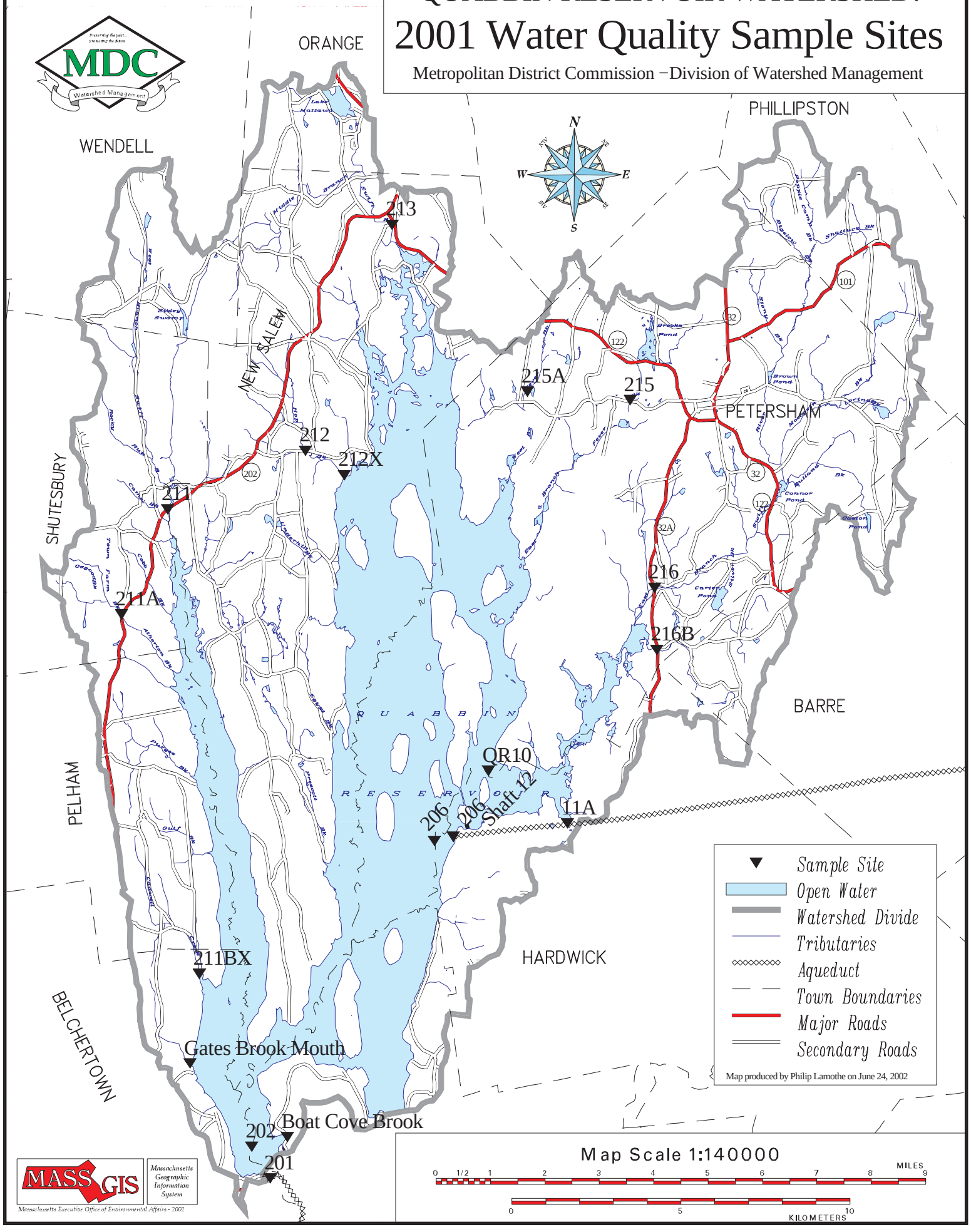


Table 8

Ware River Tributaries: 2001 Sampling Stations

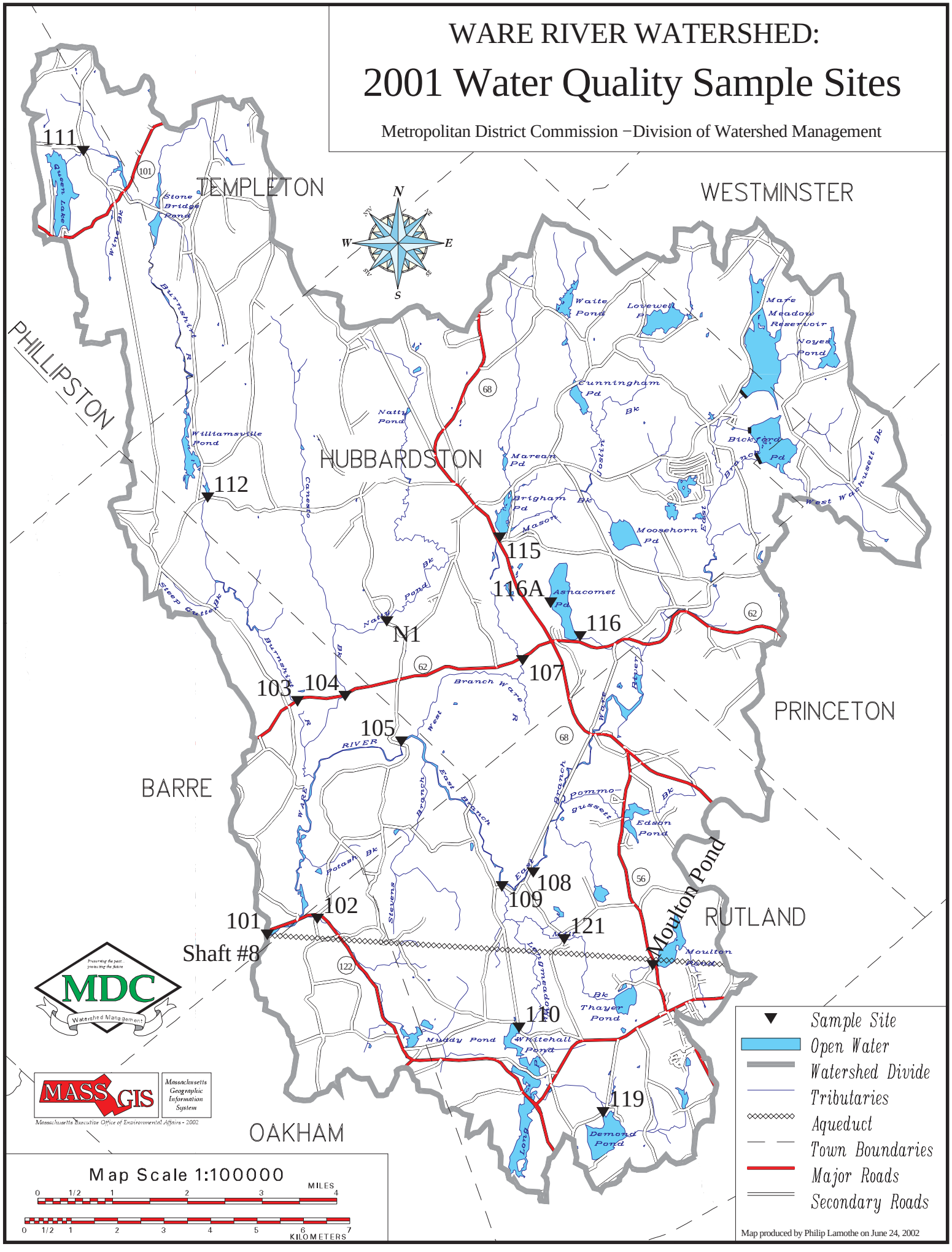
Tributary	Sample Site #	Sample Frequency[1]	*Basin Characteristics*		
			Drainage Area (sq. miles)[2]	% Wetland Coverage[3]	% MDC Owned Land[4]
Ware River @ Shaft 8 (intake)	101	BW	96.5	13.2%	37.1%
Burnshirt River @ Rt. 62	103	BW	18.4	11.7%	23.5%
Cannesto/Natty @ Rt. 62	104	BW	12.7	8.7%	28.0%
Ware River @ Barre Falls	105	BW	55.1	15.6%	34.5%
Parker Brook @ mouth	102	BW	4.9	9.6%	82.7%
West Branch Ware @ Rt. 62	107	BW	16.6	15.1%	44.9%
East Branch Ware @ New Boston Rd.	108	BW	22.0	16.5%	12.3%
Longmeadow Brook @ mouth	109	BW	12.2	16.5%	47.8%
Long and Whitehall Pond @ outlet	110	BW	5.4	17.8%	37.7%
Queen Lake @ road culvert	111	BW	0.7	36.8%	0%
Burnshirt River @ Williamsville Pond	112	BW	11.4	14.5%	2.5%
Natty Pond Brook @ Hale Road	N1	BW	5.5	14.0%	33.2%
Moulton Pond @ outlet	Moult Pd	BW	1.7	16.4	2.0
Brigham Pond @ outlet	115	BW	11.4	15.4	37.4
Asnacomet Pond @ outlet	116	BW	0.8	29.8	20.9
Demond Pond @ outlet	119	BW	2.3	18.2	14.2
Mill Brook @ Charnock Hill Road	121	BW	3.5	15.5	13.1

Notes:
[1]BW = biweekly meaning happening once every two weeks. Prior to May 1990 tributaries were monitored on a monthly basis.
[2]Source: Massachusetts Geographic Information System, Executive Office of Environmental Affairs. Latest revision 3/90.
[3]Source: DEP Wetland Conservancy Program (interpreted from 1:12000 Spring 1992-93 photos, latest revision 4/96).
[4]Source: Automated by Massachusetts Geographic Information System & MDC, latest revision 6/97.

WARE RIVER WATERSHED:

2001 Water Quality Sample Sites

Metropolitan District Commission −Division of Watershed Management



Map produced by Philip Lamothe on June 24, 2002

Table 9 – 2001 Tributary Water Quality Data: Quabbin Reservoir Watershed

Parameter	Observed Range of Values					Massachusetts Water Quality Standard
	Min.	Max.	Avg.	Median[1]		
				CY 2001	% Change vs. Historic	
Biological						
Total Coliform Bacteria	35	10,000	769	420	+663.6%	No Standard
Fecal Coliform Bacteria	0	190	17	6	-33.3%	† mean 20
Physical and Chemical Characteristics						
Turbidity (NTU)	0.2	3.2	0.7	0.6	+50%	See narrative text.
Color (units)	7	85	33	28	-1.3%	††15
Dissolved Oxygen(mg/L)	3.2	15.9	10.6	10.4	+3.0%	†min. 75%
Temperature	0°C	23°C	9°C	9°C	-----	†max. ≤20°C
pH (units)	5.1	7.5	6.5	6.4	+1.6%	†6.5-8.3
Alkalinity (mg/L as CaCO3)	1.6	35.5	8.0	6.8	+36%	See narrative text.
Hardness (mg/L as CaCO3)	5	33.6	13.1	12.6	+10.5%	See narrative text.
Specific Conductance (micromhos per cm)	23	185	76.8	78	+36.8%	See narrative text.
Inorganic Compounds						
Iron (PPM)	0.03	1.10	0.34	0.27	+50%	†† 0.3 PPM
Chlorides (PPM)	1.5	25.6	12.3	13.0	+25.6%	†† 250 PPM

Notes:

† *MA Inland Class A Water Body Standards* - Minimum standard for surface waters to sustain and protect them from the degradation of their designated use(s).

†† *MA Secondary Drinking Water Standards* - These standards are meant only to serve as a guide, the parameters are not known to cause a health risk but may affect the taste, odor and color of water.

1.) Coliform bacteria concentration reported as number of colony forming units (CFU) per 100 mL.

2.) [1]Historic median values based on 1990 thru 1999 MDC Quabbin Laboratory records. "NC" refers to "No Change".

3.) PPM - Parts per million, equivalent to one drop in 10 gallons. 1 PPM = 0.9997 mg/L.

Table 10 – 2001 Tributary Water Quality Data: Ware River Watershed

Parameter	Observed Range of Values					Massachusetts Water Quality Standard
	Min.	Max.	Avg.	Median[1]		
				CY 2001	% Change vs. Historic	
Biological						
Total Coliform Bacteria	2	4400	462	267	+434%	No Standard
Fecal Coliform Bacteria	0	980	34	5	NC	† mean 20
Physical and Chemical Characteristics						
Turbidity (NTU)	0.3	7.3	1.12	0.8	+33%	See narrative text.
Color (units)	7	240	65	58	+23%	††15
Dissolved Oxygen(mg/L)	0.6	16.8	9.2	8.9	-7%	†min. 6.0 mg/L
Temperature	0°C	28°C	11.6°C	12°C	----	†max. #20EC
pH (units)	5.6	7.1	6.3	6.3	NC	†6.5-8.3
Alkalinity (mg/L as CaCO3)	2.0	23.9	7.4	6.4	+16%	See narrative text.
Hardness (mg/L as CaCO3)	6.4	34.5	14.8	12	-4%	See narrative text.
Specific Conductance (micromhos per cm)	32	350	106.6	72	+24%	See narrative text.
Inorganic Compounds						
Iron (PPM)	0.04	5.6	0.90	0.58	+115%	†† 0.3 PPM
Chlorides (PPM)	5.0	55.5	20.4	13.2	+12%	†† 250 PPM

Notes:

† *MA Inland Class A Water Body Standards* - Minimum standard for surface waters to sustain and protect them from the degradation of their designated use(s).

†† *MA Secondary Drinking Water Standards* - These standards are meant only to serve as a guide, the parameters are not known to cause a health risk but may affect the taste, odor and color of water.

1.) Coliform bacteria concentration reported as number of colony forming units (CFU) per 100 mL.

2.) [1]Historic median values based on 1990 thru 1999 MDC Quabbin Laboratory records. "NC" refers to "No Change". Percent rounded to nearest whole number.

3.) PPM - Parts per million, equivalent to one drop in 10 gallons. 1 PPM = 0.9997 mg/L.

2.3 Reservoir Monitoring

The reservoir monitoring program builds on a historic data set that is used to track the ecological health of the reservoir and to detect trends that may signal changes to the trophic status of the reservoir. The data has been used to develop specialized models and for tracking of long-term trends. Water quality data is collected monthly except during periods of adverse weather and ice conditions in the winter. Three sampling stations were routinely sampled in 2001. A fourth station "3A" was added to study total coliform bacteria populations in the reservoir. The locations of the monitoring stations are depicted in Figure 6, and were introduced earlier in this report.

Water samples were collected at depth with a kemmerer bottle and analyzed at Quabbin laboratory for turbidity, color, pH, alkalinity, chloride, hardness and iron. Samples taken at the surface, 5 meter depth and intake depth were analyzed for total and fecal coliform bacteria. Physiochemical samples are taken from mid-epilimnion and mid-hypolimnion during times of thermal stratification, and near the top and bottom during periods of isothermy and mixing. Wind, weather, reservoir conditions and air temperature are recorded on each survey. A standard 20 cm diameter black and white secchi disk is used to measure transparency.

Water column profiles of temperature, pH, dissolved oxygen, and specific conductance are measured "in-situ" using a Hydrolab Data Sonde 4a multiprobe. Readings are taken every meter during times of thermal stratification and mixing, and every three meters during periods of isothermy. Field data is stored digitally in a hand-held Hydrolab Surveyor 4A and transferred to a computer database maintained at Quabbin laboratory.

This report is supplemented by nutrient and phytoplankton results from quarterly sampling performed in conjunction with the reservoir monitoring program. Quarterly sampling was conducted at the onset of thermal stratification (May), in the middle of the stratification period (late July), near the end of the stratification period (October), and during a winter period of isothermy (December). The MWRA Central Laboratory provided analytical support for the analysis of total phosphorous, total kjeldahl nitrogen, nitrate, ammonia, UV254 absorbance and silica. Dave Worden, Limnologiost at the MDC Wachusett Section provided field support and guidance and has conducted all analyses of phytoplankton samples. In 2001, water samples were collected quarterly for these parameters and results are included in the appendix of this report.

Table 11 presents an overview of reservoir water quality conditions at four stations routinely monitored in 2001. The complete data for individual stations is included in Appendix D. Provided below is a brief discussion of selected monitoring parameters and their significance to reservoir water quality conditions.

Table 11. Water Quality Overview: Quabbin Reservoir Monitoring Stations (2001).

	Total Coliform Colonies			**Fecal Coliform Colonies**			**Secchi Disk Transparency**	**Turbidity**	**Color**
Reservoir Station	Percent <100/100mL	Geometric Mean	# of Samples	Percent <20/100mL	# of Samples	Maximum #/100mL	Range (meters)	Range NTU	Range TCU
Winsor Dam (202)	61.90%	40	84	100%	35	6	7.6-11.0	0.2-0.3	5
"3A"	66.67%	44	84	100%	33	10	---	---	---
Shaft 12 (206)	66.67%	40	84	100%	33	1	7.1-11.9	0.2-0.5	5-7
Den Hill	64.70%	20	17	100%	17	3	4.0-7.6	0.3-0.5	6-23

Total Coliform Bacteria

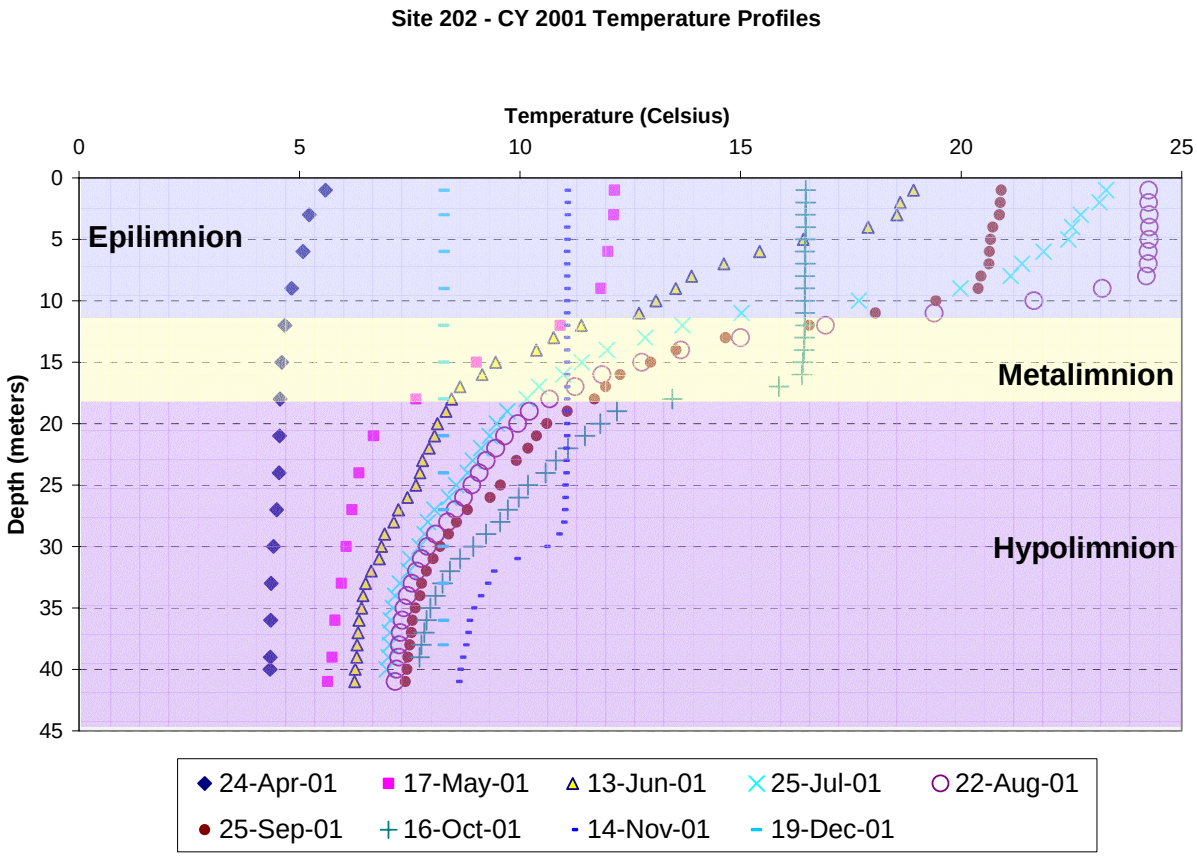
Between June 6 and December 19 total coliform bacteria concentrations were monitored weekly at three reservoir stations; Winsor Dam (202), Winsor Basin off shore of "3A", and Shaft 12 (206). Coliform bacteria monitoring at the Den Hill site was performed monthly. Looking at the data collected in this period as a whole, approximately 35% of the samples exceeded the limit of 100 CFU per 100 mL of water. The highest concentrations were measured up to 2,900 CFU/100mL on August 15 at Site 202, at a depth of 18 meters. Based on the limited data set, there was some indication of higher extremes detected in the lower depths but elevated concentrations were persistent throughout the water column. In-reservoir levels of coliform bacteria have historically been low, as example median concentrations at Site 201 over the decade of the 1990's averaged 7 CFU per 100 mL. A table of results of the special total coliform bacteria monitoring is included in Appendix B.

Fecal Coliform Bacteria

In-reservoir concentrations of fecal coliform bacteria monitored monthly remained low, even during the extended period of the apparent total coliform "bloom". The highest concentration reached was 6 colonies per 100 mL, detected at the surface of Site 202 on November 20. Seasonal gull populations that roost on the reservoir overnight have been identified as a significant contributor of fecal coliform bacteria contamination. The primary objective of the highly successful *Gull Control Program* is to move roosting gulls outside of a three mile radius from the CVA intake structure. By providing greater distances between the roost site and the CVA intake, contaminants introduced by defecating gulls are allowed to dilute, settle and die-off prior to reaching the aqueduct.

Temperature

The thermal stratification that occurs in the reservoir has a profound impact on many of the parameters monitored across the reservoir profile. The temporal zones that develop within the reservoir during the warmer months of spring and summer, known as the epilimnion, metalimnion and hypolimnion (listed in order from top to bottom), have distinct thermal, water flow and water quality characteristics. Waters of the epilimnion are warm and well mixed by wind driven currents, and, may become susceptible to algal growth due to the availability of sunlight and entrapped nutrients introduced to the partitioned layer of surface water. Within the metalimnion the thermal and water quality transition occurs between the warmer surface waters and colder, deep waters. The much deeper hypolimnic waters remain stagnant, have no circulation, and are susceptible to decaying matter and sediments that settle out from the upper layers of warmer water. Each year the reservoir is completely mixed due the settling of cooler surface waters at the time of springtime ice-out and during the cooling of surface waters in the fall. Profile data collected a Station 202 has been selected to graphically portray the thermal mixing and transition that occurs between fully mixed, isothermal to fully stratified conditions.

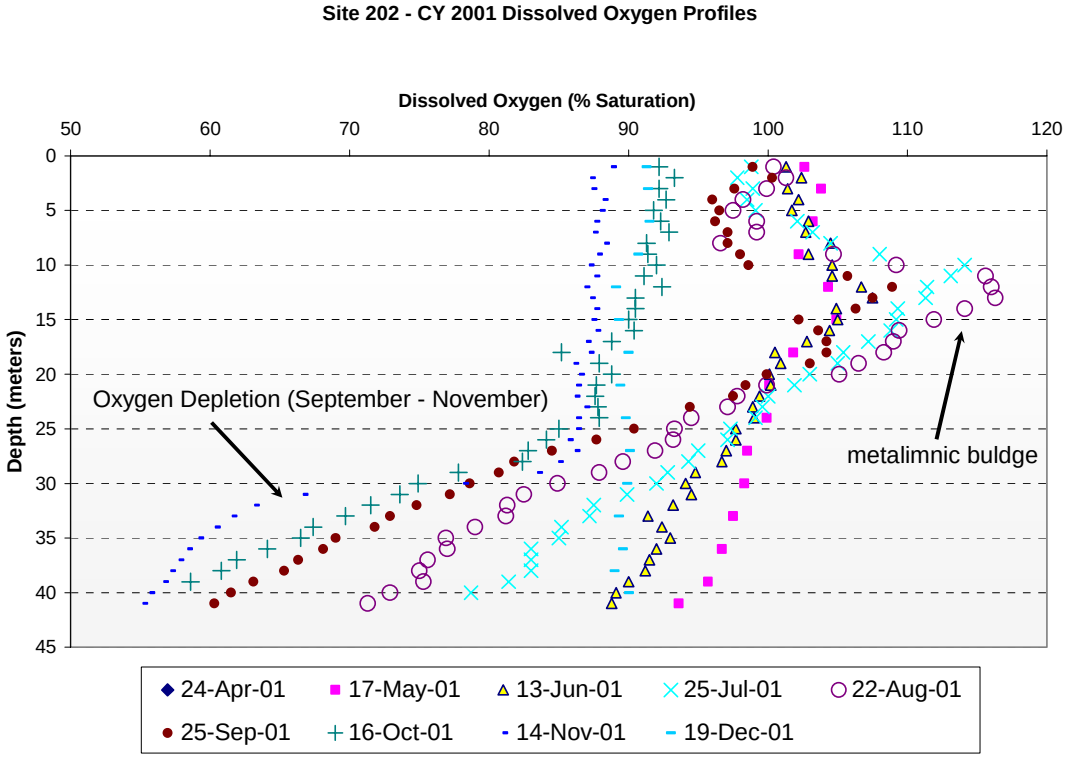


Source: 2001 MDC Quabbin Laboratory

Dissolved Oxygen

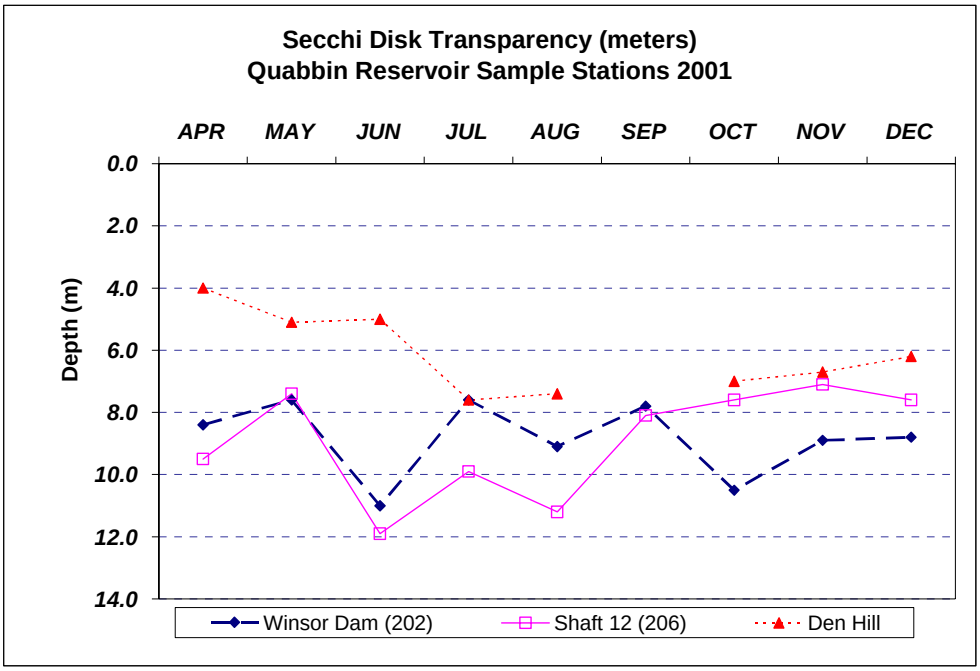
Dissolved oxygen profile measurements at Station 202 are displayed graphically below in Figure 11. Dissolved oxygen, or more specifically the loss of oxygen from the hypolimnion, is used is as one index to characterize the trophic state of a lake. Because re-aeration factors such as wind driven turbulence, reservoir currents, and atmospheric diffusion diminish with depth dissolved oxygen concentrations typically decrease with depth. Dissolved oxygen reductions are most pronounced inside the hypolimnic layer of the reservoir where the water remains stagnant and microbial decomposition activity is a large consumer of the available oxygen. Hypolimnic oxygen reserves established in the spring are not replenished until the late fall when cooling surface waters ultimately settle and re-mix the reservoir. In 2001, minimum levels of oxygen reached in the hypolimnion ranged from a low of 7.3% saturation at the Den Hill station to 58.6% saturation on the bottom depths at Station 202. Depletion levels were most pronounced in the latter stages of stratification (September and October) and at no time were anaerobic conditions measured.

In the metalimnion and epilimnion oxygen is typically abundant and often over-saturated. In this region the photosynthesis of phytoplankton becomes a factor as it serves as a significant source of oxygen. An interesting phenomenon that occurs in the reservoir is called a "metalimnic buldge" characterized by increasing concentrations of oxygen with depth. The buldge is created when photosynthetically generated oxygen inside the metalimnion becomes entrapped and accumulates inside of the density-restricted zone (depicted in figure below).



Secchi Disk Transparency

Transparency is the measure of the depth below the surface at which a 20 centimeter black and white disk becomes indistinguishable to the naked eye. Transparency can be greatly influenced by the level of phytoplankton activity but is also sensitive to weather and reservoir conditions at the time of sampling. Quabbin Reservoir's exceptional clarity is evident in the fact that transparency measurements will extend into the metalimnion. In 2001, transparency was measured at a maximum of 11.9 meters at Shaft 12 on June 13. The Den Hill station is characteristically much lower and reflects the contribution of large, nearby river inputs of the East Branch Swift and Ware River (when diverting). In 2001, transparency was measured at a minimum of 4.0 meters at Den Hill on April 24 during a period of active Ware River diversions. Monthly transparency measurements are displayed in Figure 12 below.



Turbidity and Color

Reservoir turbidity and color levels are very low reflective of the low productivity of the reservoir. In-reservoir turbidity levels monitored in 2001 ranged from 0.2 to 0.5 NTU. From time to time, algae blooms may impart color and suspended organic particulates will elevate levels of turbidity and color. Color values ranged from 5 to 23 true color units and where highest at Den Hill where the influence of tributary inputs is evident. Color levels did not go above 7 at the two, deep reservoir stations at Shaft 12 and Winsor Dam.

pH and Alkalinity

Three processes principally reflected in reservoir pH and alkalinity dynamics are direct acidic inputs (i.e. rainfall), biological respiration and algal photosynthesis. The input of acid in the form of direct precipitation will consume alkalinity available in the water and reduce pH levels. An atmospheric monitoring station has been established on Prescott Peninsula since 1987 to study ambient levels of pH. The monitoring station operated by the University of Massachusetts under the umbrella of the National Atmospheric Deposition Program (NAPD) has been established on Prescott Peninsula since 1987. NADP data on the level of pH in precipitation has remained stable over the 14 year period ranging between 4.25 and 4.50. Reservoir pH is a water quality issue of concern because levels below 6 increase the solubility of persistent heavy metals such as mercury, allowing the metal to be incorporated into the water system and more readily accumulated in the tissue of living organisms. As evidence to the problem Quabbin Reservoir, like many northeastern lakes, has posted fish consumption advisories that suggest limiting the quantity of fish consumed because of the presence of higher levels of mercury. Alkalinity serves as a water body's principal defense by neutralizing the effects of pH. Both pH and alkalinity have a long-term record of stability but levels will fluctuate due to reservoir dynamics. Fluctuations may be caused through respiration, the intake of oxygen and release of carbon dioxide by organisms. The result will be an increase in alkalinity due to the input of carbon to the water. Photosynthetic activity in the epilimnion and metalimnion can decrease alkalinity and increase pH due to the consumption of free carbon dioxide and bicarbonate.

Reservoir water is slightly acidic with pH in the epilimnion slightly higher than the bottom waters. Mean (geometric) values in the epilimnion were around 6.6 and hypolimnion levels were around 6.0 at each of the three stations. Reservoir alkalinity is low and averaged 4.2 mg/L as Ca CO_3 across the three reservoir stations with very little variation observed.

3.0 SPECIAL INVESTIGATIONS

Provided below is a brief overview of specialized studies and investigations that involved Quabbin Reservoir and its contributing tributaries. Laboratory results from MDC DWM field investigations are included in water quality data tables found in the appendices of this report.

Pathogen Monitoring

In coordination with the MWRA, the MDC continued its monitoring program for pathogens at the point of entry to the Chicopee Valley Aqueduct. A total of twenty four samples were collected biweekly from a tap inside the Winsor Power Station (representative of water entering the intake at approximately 70 feet below the reservoir surface). The pathogenic organisms of specific concern are Cryptosporidium spp. oocysts and Giardia spp. cysts because of their relatively high resistance to disinfectants, prolonged life-cycles and their low doses of infectivity. Sample collection and analysis follows protocols established for the immunoflourescence assay method (IFA Method) under the EPA's 1996 Information Collection Rule. Samples were sent to the Erie County Water Authority of New York for this specialized analysis. MDC staff performs the necessary filtering process during collection and ships the ice-preserved samples within 48 hours of collection. Equipment utilized during collection includes a flowmeter, polypropylene-wound filter cartridge (1 um), and clear laboratory tubing. A target sample volume of 100 gallons was attained during each sampling event. All 2001 results were below detection limits. Detection limits ranged from 0.26 to 1.06 cysts per 100 liters.

Reservoir Phytoplankton and Nutrient Dynamics

Nutrient and phytoplankton samples were collected from three reservoir monitoring stations quarterly. The 2001 results build on a dataset begun by the MDC in 1998. The MWRA Central laboratory analyzed the samples for total phosphorus, UV 254, silica, total Kjeldahl-nitrogen, nitrate, and ammonia-nitrogen. Phytoplankton analysis has been performed by Dave Worden, MDC Limnologist. Analytical results from this ongoing study are included the Appendix C of this report. For further information a companion MDC report is available for review entitled "Nutrient and Plankton Dynamics in Quabbin Reservoir: Results of the MDC/DWM's 1998-99 Sampling Program".

Stream Surveys

DWM staff continued to monitor site-specific water quality impacts related to development pressures, wildlife populations, and construction activities occurring throughout the watershed. Table 13 summarizes DWM staff investigations, activities and findings. Further information on field sampling and stream survey investigations can be found in Appendix D of this report.

Table 13. 2001 Special Investigations and Sampling Events

Stream Basin/ Location	Date(s)	Samples Collected?	Results
Boat Cove Brook	March 23 March 29	Yes	Follow-up stream survey in response to elevated bacteria levels. Remains of coyote kill and deer scat next to the brook believed to be responsible for the elevated levels.
Middle Branch Swift	May 16	No	Follow-up stream survey in response to elevated bacteria levels. No cattle grazing in upstream pasture. Beaver dam (2 ft) actively being worked upstream and within 1000 feet of sample site.
Quabbin Reservoir	June 6 to Dec. 29	Yes	Samples collected weekly at three reservoir monitoring stations to document total coliform bacteria dynamics.
Comet Pond Beach	June 13/14 June 22	Yes (Bacteria)	Investigative sampling and survey following elevated bacteria levels.
Sibley Swamp	July 20 July 27	Yes (Phytoplankton)	Follow-up stream survey in response to a report of an "Iridescent red plume" in the water. Based on field investigations and a microscopic analysis by MDC staff limnologist, plume determined to be of natural origin related to the decomposition of vegetation and release of natural oils.

Reservoir Total Coliform Dynamics

Starting in June MDC staff began a program of collecting weekly total coliform bacteria data at three reservoir stations to further document the occurrence of elevated in-reservoir levels. Researchers from the University of Massachusetts at Amherst first investigated the total coliform phenomena in 1996. At that time it was suggested that favorable micro habitat provided by leaf litter could have explained similar "blooms" experienced in the fall of 1995. Other University of Massachusetts researchers also encountered "bloom" effects in spiked dialysis bags suspended in reservoir water during die-off studies performed in September and October 1995 (Wolfram, 1996). Both studies alluded to the possibility that apparent growths could have been the result of bacterial multiplication induced by the freshwater environment. Research findings reported by Brettar and Höfle (1992) in mesocosm studies were used to support the theory that "blooms" were a product of multiplication and survival in what is generally considered an unfavorable environment. More information and study is needed at this time to better explain the apparent growth phenomenon. Results are presented in table format in Appendix B.

University of Massachusetts Research Projects

During 2001, MDC collaborated with both the Department of Civil and Environmental Engineering and with the Water Resources Research Center at the University of Massachusetts at Amherst on projects concerning water quality at Quabbin Reservoir. MDC participated by providing in-kind laboratory services.

The first project launched in April 2001 is Phase IV of the Massachusetts Acid Rain Monitoring (ARM) Project. The ARM project is largely a volunteer effort coordinated by the Water Recourses Research Center at the University of Massachusetts that aims to collect data on ph, alkalinity, total phosphorous and major ions at a minimum of 150 lakes and ponds located across Massachusetts. Results are used to assess the impacts from acid rain and will build on ten years of data collected between 1983 and 1993. The MDC Quabbin laboratory's contribution to the project included analysis three times per year of ph and alkalinity for up to forty lake and stream samples. The MDC laboratory is not expected to participate in the program in 2002 because of budget constraints

MDC laboratory staff cooperated with the Department of Civil and Environmental Engineering on an AWWA Research Foundation project titled Development of Event-based Pathogen Monitoring Strategies for Watersheds. Starting in November 2001, MDC staff collected monthly water samples from two streams on the Prescott Peninsula, Middle Branch of Dickey Brook and Griswold Brook. MDC personnel collect monthly samples on the second Wednesday of every month and typically 50-mL, 20-mL, 20-mL and 5-mL dilutions are run for total coliform and fecal coliform bacteria analysis. The Massachusetts Water Resources Authority (MWRA) Deer Island laboratory analyzes the samples for total phosphorus, total suspended solids, total Kjeldahl-nitrogen, and ammonia-nitrogen. Monthly samples are being collected to document ambient background concentrations. Additionally, event-based samples are being collected to document storm water loading and transport of microbial indicators. In one December storm event, MDC staff processed thirty-two samples and performed more than 140 analyses because of the need for many dilutions. Future sampling is planned to continue into 2002.

Security Monitoring

Commencing September 23, Winsor Dam, Goodnough Dike and other structures and approaches were put under guard and the public excluded in the wake of secondary fears that surfaced following the September 11 attacks. Beginning on September 29 MDC Environmental Quality (EQ) staff conducted weekly monitoring exercises that collected profile data on water quality and through shoreline observations collected information on activities occurring within the sensitive intake areas. EQ staff efforts were scaled back on December 29 with the onset of winter weather. However, public access continues to be restricted in some areas and a detail of the National Guard has been on constant patrol.

Section 3.0A

Incident Report Forms
Stream Surveys

EQ FILE REPORT

Inspector: P. Reyes
File # WR-008
Date: 3/23 and 3/29 01

[x] Field Investigation
[ ] Meeting
[ ] Phone Conversation

District: Quabbin Reservation
Subdistrict: Winsor
Time: 8:30 – 9:00 AM
Weather: Overcast, temperature in the upper 20's, deep snow

Activity

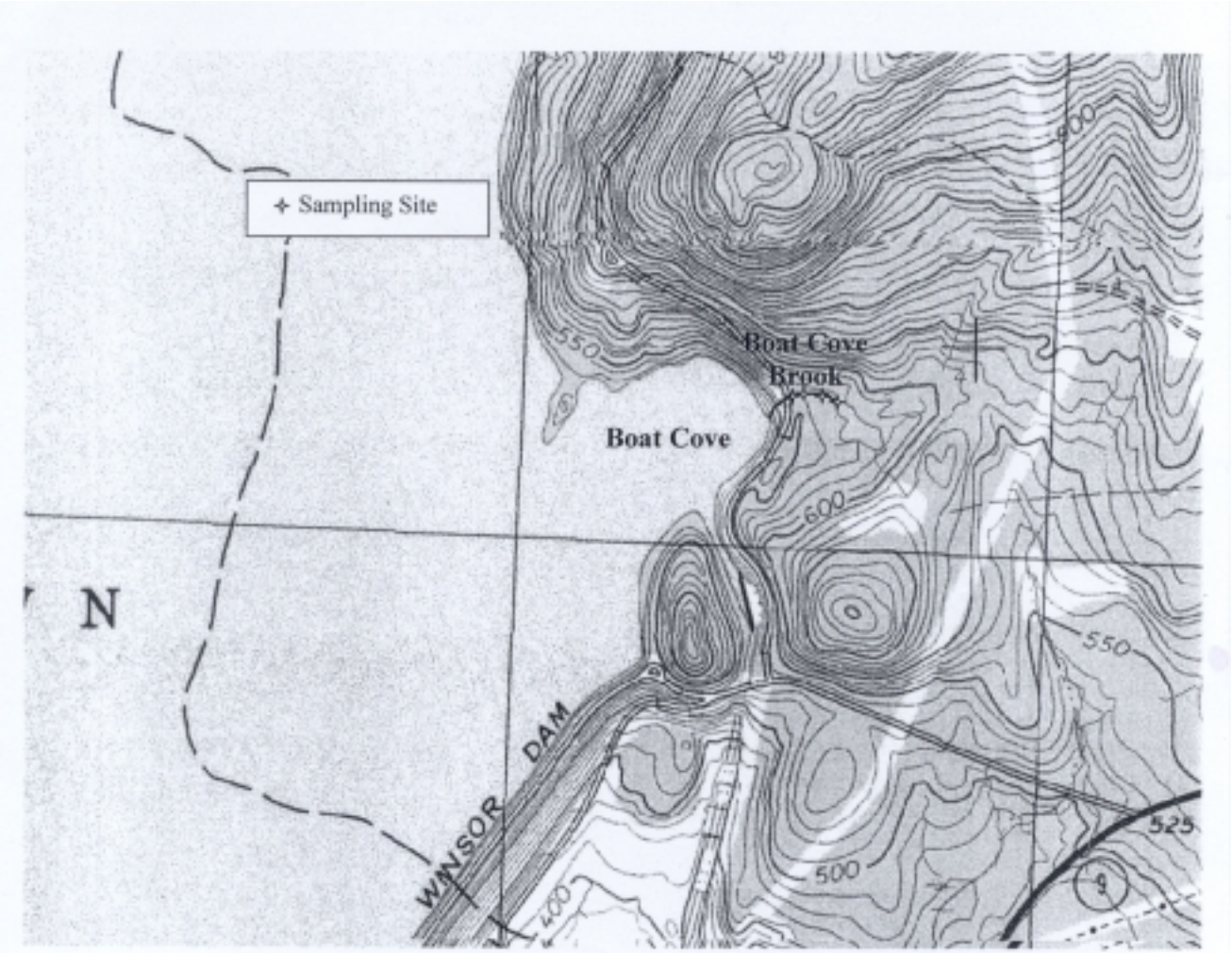
[ ] Wastewater	[ ] Construction	[ ] Haz. Waste
[ ] Agricultural	[ ] Sedimentation/Erosion	[ ] Recreation
[x] Wildlife	[ ] Trash/Dumping	[ ] Other - unknown

Results from 3/19/01 biweekly sampling at Boat Cove Brook (at the culvert on the eastern side of the road) showed unusually high fecal coliform concentrations (17/100 ml). Normal levels are usually in the single digits. Follow up sampling on 3/19/23 showed fecal coliform levels of 14/100ml. This was still an unusually high level, and a search for a cause was undertaken on 3/29/00. A walk along the brook turned up the remains of a deer from a coyote kill next to the water, and numerous piles of deer fecal matter. Four additional samples were collected during the inspection on the 29th, one at the usual sample site (culvert), and three more at approximately 100', 250' and 500' upstream from the culvert (see map). The 500' sample was collected directly below an abandoned beaver pond.

Lab analysis of the samples showed that fecal coliform counts had returned to normal levels. No definite cause was found for the problem, but two possible sources were identified. Heavy rains and melting snow had produced high runoff, and might have washed deer fecal matter form the coyote kill and from deer droppings into the brook, thus raising fecal coliform levels. The beaver pond might also have been the source. The samples collected on the 29th showed fecal coliform levels directly below the pond to be 5/100 ml, and these levels decreased down to zero at the culvert. The high runoff might have caused a release of coliforms from the beaver pond.

Sampling Date	Sampling Site	Fecal Coliforms/100 ml
3/19/01	Boat Cove Brook (culvert)	17
3/23/01	Boat Cove Brook (culvert)	14
3/29/01	Boat Cove Brook (culvert)	0
	Boat Cove Brook (100')	2
	Boat Cove Brook (250')	2
	Boat Cove Brook (500')	5

Signature of inspector Paul Reyes (4/11/01)
Paul O. Reyes, BSME, MSEnvE (Signed under the paines and penalties of perjury)


Sampling Site
Boat Cove Brook
Boat Cove
N
WINSOR DAM
550
600
500
400
525

EQ FILE REPORT

File # QSIB_005.F01a
Date: July 20 & 27, 2001

[X] Field Investigation
[ ] Meeting
[ ] Phone Conversation

Site: Sibley Swamp Headwaters
Time: 9:00 AM
Weather: Sunny, near 70.
Prev 24 hrs: AM rain showers

Contact: Robie Hubley
Company: Massachusetts Audubon Society
Phone: (617) 523-8448

Address:

Activity

[ ] Wastewater	[ ] Construction	[ ] Haz. Waste
[ ] Agricultural	[ ] Sedimentation/Erosion	[ ] Recreation
[X] Wildlife	[ ] Trash/Dumping	[ ] Other –

In response to a sighting made by Robie Hubley of a "blood-red, iridescent plume" entering Sibley Swamp on the evening of July 19, follow-up investigations were performed on July 20 and 27.

The survey area among the headwaters of Sibley Swamp contain largely undeveloped tracts of land owned by only a few landowners. The forested landscape is "wild" in character with ample signs of such solitary animals as moose. Investigating the headwaters in the NW region of Sibley a similar purple-reddish brown hue being refracted off of a film-like substance was observed in the small man-made pond located above Jennison Road and adjacent to the Bennett property. Ms. Bennett was questioned about the phenomena and she seemed concerned for her landscaped pond. Permission was granted to inspect the pond and sample as needed. On closer inspection of the film, the refraction was lost and the floating matter was pale grey in color and behaved film-like (i.e. not individual particles like pollen but almost oily). A faint earthy odor was all that was detectable.


Sibley Swamp Headwaters, Wendell

The film emerged from the upper portion of the pond that was more bog-like in appearance; spag moss and woody shrubs inundated by shallow water. Further upstream approximately 600-800 feet lies an abandoned gravel borrow pit on the banks of connected marshland; this land is now owned by the Division of Fisheries and Wildlife

Follow Up?

Appears to be natural phenomena.

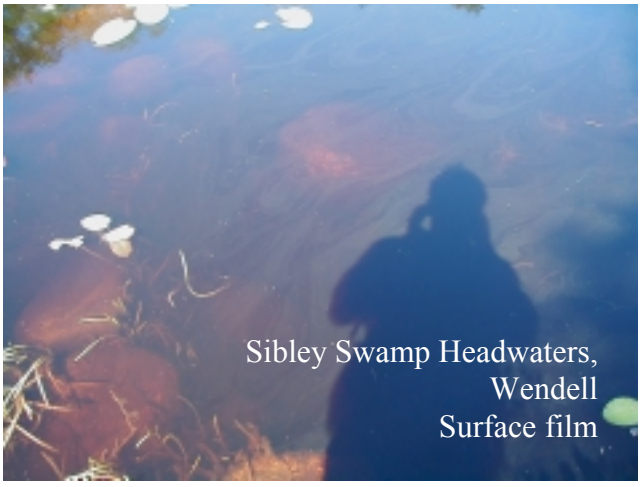
Recommend follow-up analytical testing by Dave Worden, MDC Limnologist.

Signature of inspector Scott A. Campbell

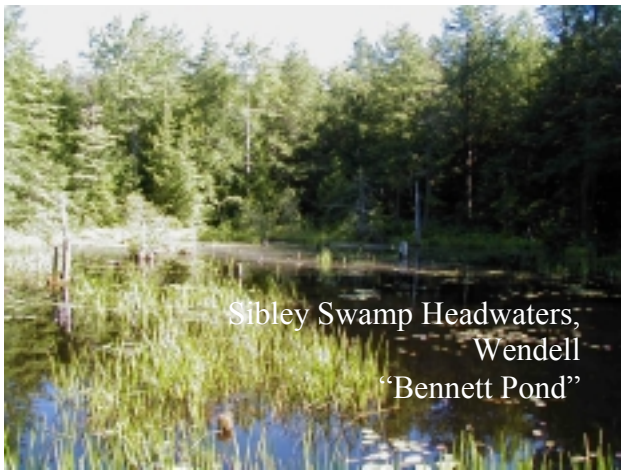
(eqrpt.vr2)

(Signed under the pains and penalties of perjury)

Service but does contain the relics from past household dumping practices (misc. metal and white goods). Downstream of Sibley Swamp pools of standing water contained high levels of iron bacteria algae and "sheen" oxides. The mysterious purple-reddish brown plume could not be explained and no specific source could be pinpointed. The phenomena appears natural but will be investigated further.



Sibley Swamp Headwaters,
Wendell
Surface film



Sibley Swamp Headwaters,
Wendell
"Bennett Pond"

Sibley Swamp, Wendell
Pool of iron bacteria

APPENDICES

A - U.S. GEOLOGICAL SURVEY FLOW DATA - 2001 CALENDAR YEAR

B – MISCELLANEOUS FIGURES AND CHARTS

C – RESULTS OF QUARTERLY NUTRIENT SAMPLING: QUABBIN RESERVOIR

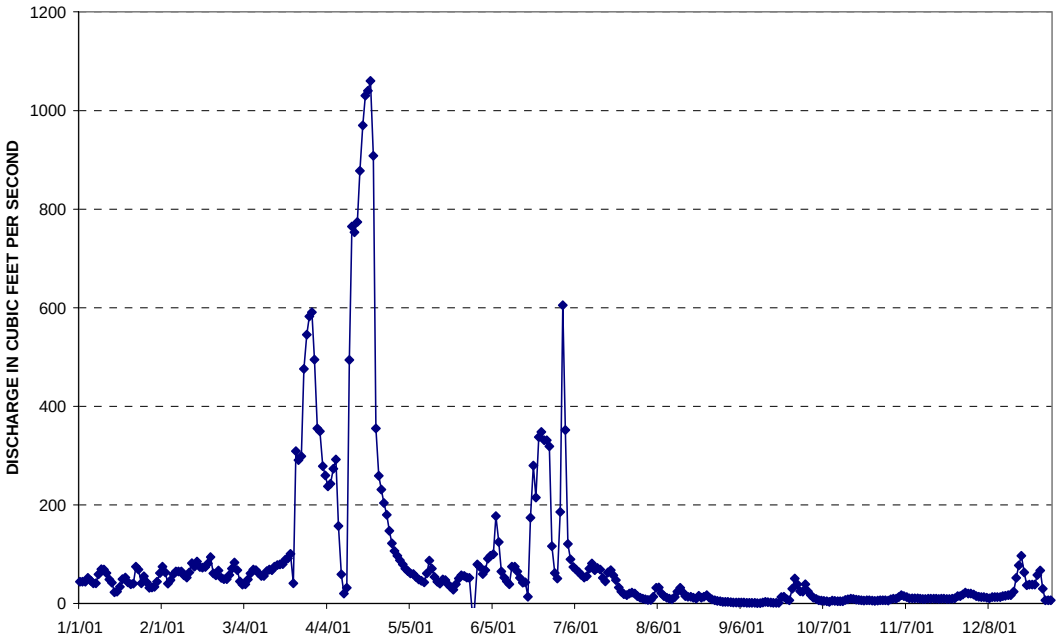
D - 2001 WATER QUALITY DATA TABLES

APPENDIX A
USGS STREAM DISCHARGE DATA

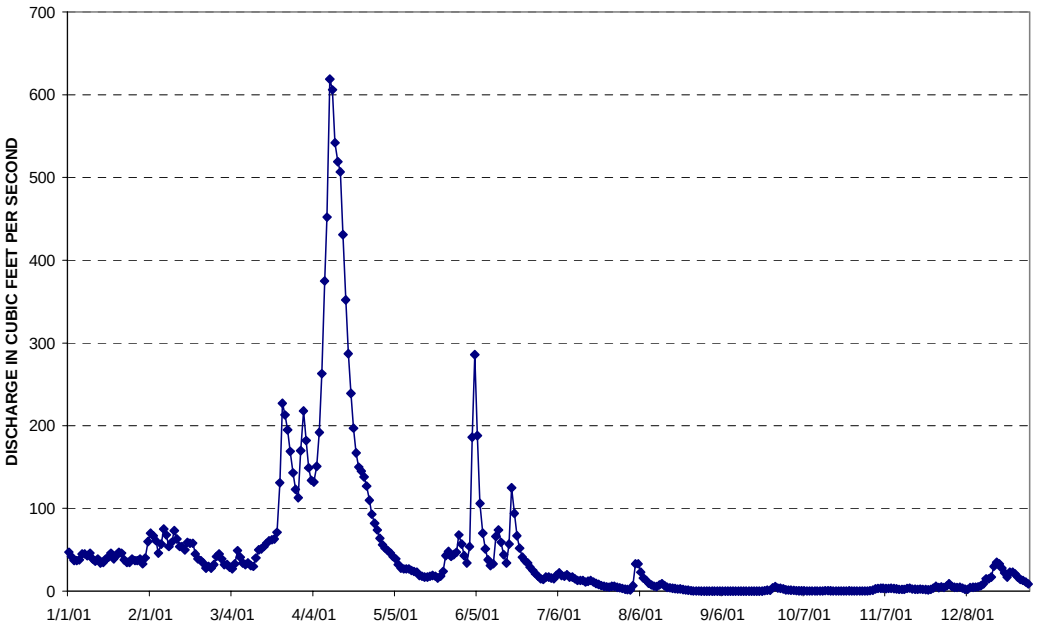
WARE RIVER AT INTAKE WORKS - DISCHARGE, CUBIC FEET PER SECOND (DD 01),
JANUARY 1, 2001 TO DECEMBER 31, 2001
DAILY MEAN VALUES

DATE	Jan 2001	Feb 2001	Mar 2001	Apr 2001	May 2001	Jun 2001	Jul 2001	Aug 2001	Sep 2001	Oct 2001	Nov 2001	Dec 2001
1	44	75	68	349	88	60	605	8.7	3.5	25	8.5	20
2	44	63	45	279	79	68	352	7.4	2.9	17	9.5	18
3	44	40	38	260	71	91	121	7.7	2.2	12	10	15
4	52	48	39	238	66	97	90	14	2.4	9.2	13	14
5	46	59	49	243	61	100	74	32	2.5	6.9	17	13
6	41	65	61	273	60	177	69	33	2.1	5.9	15	13
7	41	65	69	292	54	125	64	21	1.9	5.3	13	12
8	59	65	68	157	49	65	58	15	1.6	4.3	11	11
9	70	57	62	59	46	53	53	12	1.3	3.8	11	13
10	69	53	56	20	43	45	55	9.8	1.3	5.9	11	13
11	62	63	56	32	61	39	71	8.8	1.2	5.6	11	13
12	49	82	66	494	87	75	81	13	0.98	4.8	9.9	13
13	42	75	69	765	71	75	68	24	0.9	4.6	9.4	15
14	23	85	68	753	54	65	72	32	2.4	5	9.4	16
15	24	74	75	774	44	52	69	23	3.4	7.8	9.6	17
16	34	73	78	878	40	42	52	15	2.7	9	10	17
17	50	74	79	970	49	43	45	14	1.9	10	10	24
18	53	81	80	1,030	48	14	63	14	1.6	9.3	9.5	52
19	43	94	89	1,040	39	174	68	12	1.3	8	9.2	77
20	39	61	92	1,060	34	280	57	9.9	1.3	7.2	9.7	97
21	40	57	101	908	28	215	48	16	13	6.6	9.5	63
22	75	67	41	355	39	338	33	12	14	6.1	9.4	37
23	69	52	309	259	51	348	24	14	8.7	6.4	9.1	38
24	41	50	291	231	57	331	19	17	6.4	6.3	9.6	38
25	55	50	299	204	56	331	17	12	30	6.1	11	38
26	43	58	476	180	53	319	20	9	51	5.7	15	58
27	32	71	545	148	52	116	22	7	39	6.1	15	67
28	33	83	582	122	---	62	20	5.7	25	6.4	18	30
29	34		591	107	---	51	15	4.4	24	6.6	22	6.5
30	44		495	97	79	186	12	3.3	39	6.5	20	6.5
31	62		355		74		9.8	3.3		6.2		6.5
MAX	**75**	**94**	**591**	**1,060**	**88**	**348**	**605**	**33**	**51**	**25**	**22**	**97**
MIN	**23**	**40**	**38**	**20**	**28**	**14**	**9.8**	**3.3**	**0.9**	**3.8**	**8.5**	**6.5**
MEAN	47.0	65.7	173.9	419.2	56.3	134.6	78.3	13.9	9.6	7.6	11.8	28.1
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 2000												
Wy 28-00 MEAN	**180**	**180**	**327**	**405**	**219**	**139**	**68.4**	**54.2**	**64.7**	**88.5**	**137**	**171**
DEPARTURE FROM NORM	-133.0	-114.3	-153.1	14.2	-162.7	-4.4	9.9	-40.3	-55.1	-80.9	-125.2	-142.9
MIN	**17.2**	**37.5**	**118**	**129**	**73.8**	**18.2**	**9**	**4.94**	**6.12**	**7.86**	**13.9**	**29.1**
MAX	499.0	488.0	1066.0	963.0	438.0	503.0	337.0	319.0	893.0	465.0	445.0	570.0

WARE RIVER AT INTAKE WORKS NEAR BARRE, MA
CALENDAR YEAR 2001



EAST BRANCH SWIFT RIVER NEAR HARDWICK, MA
CALENDAR YEAR 2001



EAST BRANCH SWIFT RIVER NEAR HARDWICK - DISCHARGE, CUBIC FEET PER SECOND (DD 01),

JANUARY 1, 2001 TO DECEMBER 31, 2001

DAILY MEAN VALUES

DATE	Jan 2001	Feb 2001	Mar 2001	Apr 2001	May 2001	Jun 2001	Jul 2001	Aug 2001	Sep 2001	Oct 2001	Nov 2001	Dec 2001
1	47	70	32	182	52	34	17	1.9	0.01	1.3	0.68	8.9
2	42	67	32	149	49	54	17	1.5	0	1.2	1.2	5.6
3	37	61	29	134	46	186	16	6.5	0	0.9	2.9	4.8
4	37	46	27	132	42	286	15	33	0	0.7	3.2	4.5
5	38	57	33	151	39	188	19	33	0	0.56	3.4	5
6	45	75	49	192	32	106	22	23	0	0.58	3.6	3.8
7	45	68	41	263	28	70	19	16	0	0.47	3.1	2.4
8	43	54	34	375	27	51	18	13	0	0.24	3.3	2
9	46	59	32	452	27	38	20	9.7	0	0.19	3.4	4.5
10	39	73	34	619	27	31	17	7.5	0	0.2	3	4.6
11	36	63	31	606	25	33	17	6.1	0	0.2	2.8	5
12	39	54	30	542	24	66	15	5.4	0	0.22	2.2	5.1
13	34	54	40	519	23	74	13	7.5	0	0.21	2	6.3
14	35	50	50	507	19	59	13	9.2	0	0.17	2.2	9
15	39	59	51	431	18	44	13	6.6	0	0.63	3.2	15
16	41	58	54	352	17	34	11	4.8	0	0.69	3.7	15
17	46	58	58	287	17	57	12	4.1	0	0.53	2.5	17
18	39	45	61	239	18	125	13	3.6	0	0.35	2.3	30
19	43	39	62	197	19	94	11	3	0	0.25	2.2	35
20	47	37	63	167	18	67	9.3	2.6	0	0.22	2.5	33
21	46	34	71	150	16	52	8.3	2.7	0.1	0.18	2.1	28
22	38	28	131	145	18	41	6.9	1.9	0.74	0.18	1.9	22
23	35	30	227	138	24	37	5.9	1.3	1.1	0.19	1.7	17
24	35	28	213	127	43	34	5.2	1.1	0.89	0.39	2.1	23
25	39	32	195	110	48	29	5	0.59	4.1	0.3	3.8	23
26	37	42	169	93	42	25	5.9	0.33	5.7	0.23	5.8	21
27	37	45	143	82	44	21	5.9	0.21	3.8	0.22	4.3	17
28	39	39	123	74	47	18	4.7	0.18	3.4	0.2	5.1	14
29	33		113	64	68	15	3.9	0.11	2.7	0.17	4.5	13
30	40		170	56	57	14	3.2	0.02	1.6	0.29	6.4	11
31	60		218		43		2.4	0		0.28		8.7
MAX	**60**	**75**	**227**	**619**	**68**	**286**	**22**	**33**	**5.7**	**1.3**	**6.4**	**35**
MIN	**33**	**28**	**27**	**56**	**16**	**14**	**2.4**	**0**	**0**	**0.17**	**0.68**	**2**
MEAN	40.5	50.9	84.4	251.2	32.8	66.1	11.8	6.7	0.8	0.4	3.0	13.4
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 2000												
WY 37-00 MEAN	**81.7**	**81.7**	**136**	**160**	**91.9**	**59.4**	**29.1**	**23.2**	**26.4**	**39.1**	**63.4**	**76.6**
DEPARTURE FROM NORM	-41.2	-30.8	-51.6	91.2	-59.1	6.7	-17.3	-16.5	-25.6	-38.7	-60.4	-63.2
MIN	**5.3**	**18.5**	**48.2**	**34.8**	**30.5**	**6.87**	**3.23**	**0**	**0**	**2.55**	**6.93**	**19.9**
MAX	**240**	**207**	**266**	**420**	**189**	**175**	**179**	**127**	**390**	**155**	**177**	**264**

WEST BRANCH SWIFT RIVER - DISCHARGE, CUBIC FEET PER SECOND (DD 01)

JANUARY 1, 2001 TO DECEMBER 31, 2001

DAILY MEAN VALUES

DATE	Jan 2001	Feb 2001	Mar 2001	Apr 2001	May 2001	Jun 2001	Jul 2001	Aug 2001	Sep 2001	Oct 2001	Nov 2001	Dec 2001
1	15	32	67	36	25	13	13	3.6	1.9	3.2	8.5	5.3
2	16	28	32	32	24	31	12	3.6	1.7	3	9.5	4.6
3	15	30	31	31	22	120	9.9	5.9	1.7	3	10	3.7
4	14	61	30	34	21	57	9.3	6.7	2.3	3.2	13	3.5
5	13	52	44	41	19	34	14	5	2.3	3.2	17	3.3
6	13	109	109	53	18	24	16	4.4	1.9	3.7	15	3.2
7	12	47	59	71	17	19	13	3.8	1.9	3.7	13	3.0
8	12	27	39	110	16	16	11	3.5	1.8	3.3	11	2.8
9	13	28	37	132	15	14	12	3.3	1.7	3.2	11	3.3
10	15	40	39	193	15	12	10	3.2	2	3.4	11	3.1
11	16	101	39	164	14	14	10	2.9	3.4	3.4	11	3.2
12	12	98	40	167	13	33	9.3	2.7	2.7	3.8	9.9	3.3
13	22	32	46	166	12	23	8.5	3.2	2.3	3.7	9.4	4.0
14	12	30	53	171	11	17	8.2	4.9	3.4	3.8	9.4	6.1
15	13	40	31	146	11	14	8.3	5.3	3.3	6.9	9.6	13.2
16	14	36	17	125	11	12	7.4	4.1	2.6	5.9	10	9.2
17	16	40	18	108	11	22	8.4	3.6	2.3	5.2	10	7.3
18	17	81	19	91	11	24	8.2	3.4	2.1	4.1	9.5	13.1
19	17	73	18	78	11	16	7	3.2	2	3.1	9.2	12.2
20	18	31	20	70	10	13	6.4	3.1	2	3.1	9.7	9.2
21	28	34	23	72	9.1	11	6	3	17	2.9	9.5	7.7
22	52	71	72	75	11	10	5.5	2.8	9	2.8	9.4	6.3
23	23	30	101	70	15	21	5.1	2.6	5.6	2.6	9.1	5.3
24	18	29	76	57	21	44	4.8	2.5	4.2	2.9	9.6	9.0
25	18	33	56	46	29	26	4.5	2.2	6.7	2.8	3.2	8.8
26	18	45	43	38	23	18	6.5	2.1	7.2	2.5	4.6	7.0
27	17	41	36	33	30	14	6.1	2.1	5.1	2.3	4.2	5.7
28	17	43	32	30	25	11	4.7	2.1	4.1	2.3	3.8	5.6
29	29		30	28	25	9.9	4.4	2	3.7	2.2	3.9	4.8
30	20		37	26	19	9.6	4.1	1.9	3.3	2.2	4.4	4.0
31	31		41		15		3.9	2		2.1		3.8
MAX	**52**	**109**	**109**	**193**	**30**	**120**	**16**	**6.7**	**17**	**6.9**	**17**	**13.2**
MIN	**12**	**27**	**17**	**26**	**9.1**	**9.6**	**3.9**	**1.9**	**1.7**	**2.1**	**3.2**	**2.8**
MEAN	18.3	47.9	43.1	83.1	17.1	23.4	8.3	3.4	3.7	3.3	9.3	5.9
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 2000												
wy 28-00 MEAN	**30.7**	**35.7**	**44.7**	**38.9**	**31.3**	**25.7**	**10.6**	**6.98**	**10.6**	**14.3**	**21.6**	**28.6**
DEPART-URE FROM NORM	-12.4	12.2	-1.6	44.2	-14.2	-2.3	-2.3	-3.6	-6.9	-11.0	-12.3	-22.7
MIN	**11.1**	**13.6**	**30.5**	**15.3**	**10.5**	**3.73**	**1.98**	**2.03**	**1.02**	**2.58**	**6.98**	**7.19**
MAX	51.0	70.6	60.1	83.0	78.1	52.8	24.3	29.3	52.9	29.5	39.2	75.3

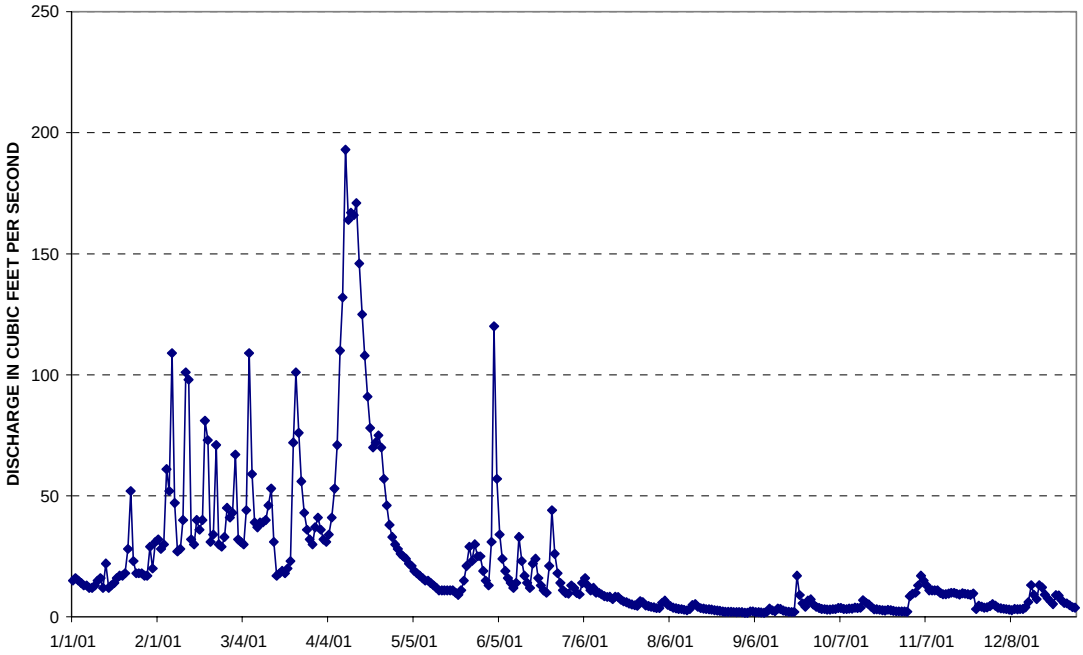
SWIFT RIVER AT WEST WARE - DISCHARGE, CUBIC FEET PER SECOND (DD 01)

JANUARY 1, 2001 TO DECEMBER 31, 2001

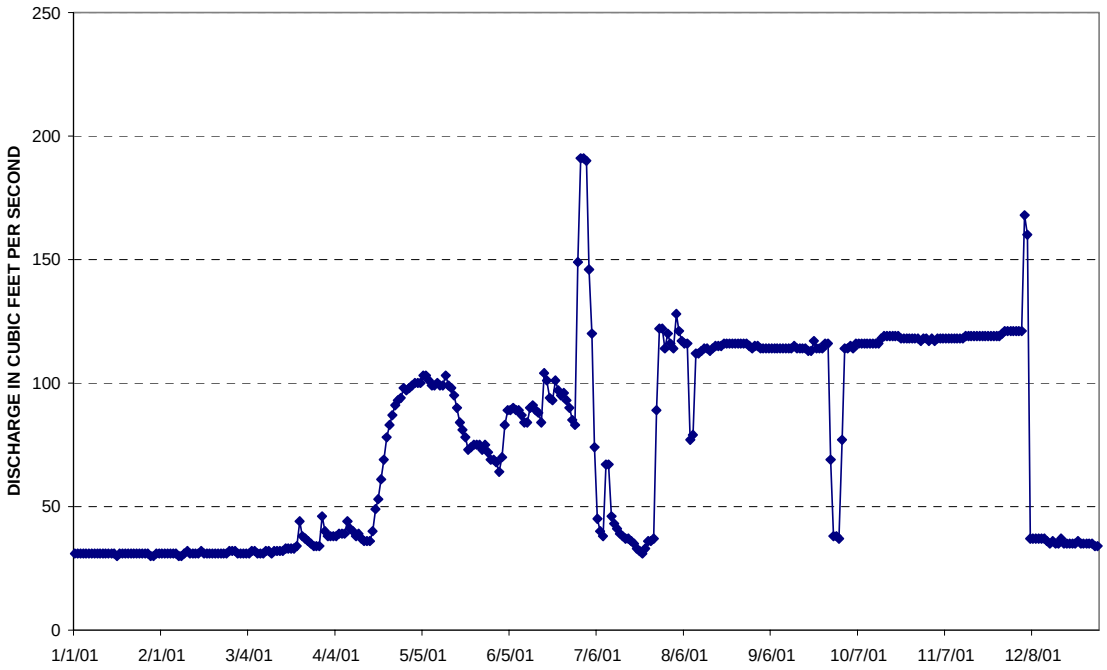
DAILY MEAN VALUES

DATE	Jan 2001	Feb 2001	Mar 2001	Apr 2001	May 2001	Jun 2001	Jul 2001	Aug 2001	Sep 2001	Oct 2001	Nov 2001	Dec 2001
1	31	31	31	38	99	64	191	116	115	77	117	121
2	31	31	31	38	100	70	190	114	114	114	118	121
3	31	31	31	38	100	83	146	128	114	114	117	121
4	31	31	31	38	100	89	120	121	114	115	118	121
5	31	31	32	39	103	89	74	117	114	114	118	168
6	31	31	32	39	103	90	45	116	114	116	118	160
7	31	30	31	39	101	89	40	116	114	116	118	37
8	31	30	31	44	99	89	38	77	114	116	118	37
9	31	31	31	41	99	87	67	79	114	116	118	37
10	31	32	32	40	100	84	67	112	114	116	118	37
11	31	31	32	38	99	84	46	112	114	116	118	37
12	31	31	31	39	99	90	43	113	114	116	118	37
13	31	31	32	37	103	91	41	114	114	116	118	36
14	31	31	32	36	99	89	39	114	115	116	119	35
15	31	32	32	36	98	88	38	113	114	118	119	36
16	30	31	32	36	95	84	37	114	114	119	119	35
17	31	31	33	40	90	104	37	115	114	119	119	35
18	31	31	33	49	84	101	36	115	114	119	119	37
19	31	31	33	53	81	94	35	115	113	119	119	35
20	31	31	33	61	78	93	33	116	113	119	119	35
21	31	31	34	69	73	101	32	116	117	119	119	35
22	31	31	44	78	74	97	31	116	114	118	119	35
23	31	31	38	83	75	95	33	116	114	118	119	35
24	31	31	37	87	75	96	36	116	114	118	119	36
25	31	32	36	91	75	93	36	116	116	118	119	35
26	31	32	35	93	73	90	37	116	116	118	119	35
27	31	32	34	94	75	85	89	116	69	118	120	35
28	30	31	34	98	72	83	122	116	38	118	121	35
29	30		34	97	69	149	122	115	38	117	121	35
30	31		46	98	69	191	114	114	37	118	121	34
31	31		40		68		120	115		118		34
MAX	**31**	**32**	**46**	**98**	**103**	**191**	**191**	**128**	**117**	**119**	**121**	**168**
MIN	**30**	**30**	**31**	**36**	**68**	**64**	**31**	**77**	**37**	**77**	**117**	**34**
MEAN	30.9	31.1	33.8	56.9	88.0	94.4	68.9	113.2	105.1	115.8	118.7	54.9
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 2000												
wy 28-00 MEAN	**73.1**	**78.7**	**84.8**	**172**	**165**	**127**	**76.8**	**78.5**	**79.1**	**71.7**	**77.2**	**73.5**
DEPARTURE FROM NORM	-42.2	-47.6	-51.0	-115.1	-77.0	-32.6	-7.9	34.7	26.0	44.1	41.5	-18.6
MIN	**27.5**	**27.6**	**27.7**	**26.2**	**27.4**	**28.6**	**31.2**	**30.7**	**30.3**	**30.3**	**31.3**	**28**
MAX	572.0	467.0	511.0	1099.0	775.0	1192.0	301.0	149.0	139.0	222.0	858.0	656.0

WEST BRANCH SWIFT RIVER NEAR SHUTESBURY
CALENDAR YEAR 2001



SWIFT RIVER AT WEST WARE
CALENDAR YEAR 2001



APPENDIX B
MISCELLANEOUS DATA TABLES

Table B.1 –Tributary Water Quality Data: Quabbin Reservoir Watershed 1998-2001

Parameter	Observed Range of Median Values					Massachusetts Water Quality Standard
	1998	1999	2000	2001	Historic 1990-99	
Biological						
Total Coliform Bacteria	110	170	280	420	50	No Standard
Fecal Coliform Bacteria	6	4	5	6	5	† mean 20
Physical and Chemical Characteristics						
Turbidity (NTU)	0.5	0.4	0.4	0.6	0.6	See narrative text.
Color (units)	28	18	33	28	47	††15
Dissolved Oxygen(mg/L)	10.4	10.6	10.4	10.4	9.6	†min. 6.0 mg/L
Temperature (°C)	7	9	9	9	----	†max. ≤20°C
pH (units)	6.3	6.2	6.2	6.4	6.3	†6.5-8.3
Alkalinity (mg/L as CaCO3)	5.3	4.9	5.2	6.8	5.5	See narrative text.
Hardness (mg/L as CaCO3)	12.3	12.9	11.5	12.6	12.45	See narrative text.
Specific Conductance (micromhos per cm)	62	68	63	78	58	See narrative text.
Inorganic Compounds						
Iron (PPM)	0.19	0.13	0.25	0.27	0.27	†† 0.3 PPM
Chlorides (PPM)	12.1	12.2	10.1	13.0	11.8	†† 250 PPM

Notes:

† *MA Inland Class A Water Body Standards* - Minimum standard for surface waters to sustain and protect them from the degradation of their designated use(s).

†† *MA Secondary Drinking Water Standards* - These standards are meant only to serve as a guide, the parameters are not known to cause a health risk but may affect the taste, odor and color of water.

1.) Coliform bacteria concentration reported as number of colony forming units (CFU) per 100 mL.

2.) [1]Historic median values based on 1990 thru 1999 MDC Quabbin Laboratory records. "NC" refers to "No Change". Percent rounded to nearest whole number.

3.) PPM - Parts per million, equivalent to one drop in 10 gallons. 1 PPM = 0.9997 mg/L.

Table B.2 –Tributary Water Quality Data: Ware River Watershed 1998-2001

Parameter	Observed Range of Median Values					Massachusetts Water Quality Standard
	1998	1999	2000	2001	Historic 1990-99	
Biological						
Total Coliform Bacteria	100	120	266	267	50	No Standard
Fecal Coliform Bacteria	3	4	5	5	5	† mean 20
Physical and Chemical Characteristics						
Turbidity (NTU)	0.7	0.7	0.7	0.8	0.6	See narrative text.
Color (units)	47	43	45	58	47	††15
Dissolved Oxygen(mg/L)	9.1	9.7	9.7	8.9	9.6	†min. 6.0 mg/L
Temperature (°C)	10	10	10	12	----	†max. ≤20°C
pH (units)	6.3	6.3	6.3	6.3	6.3	†6.5-8.3
Alkalinity (mg/L as CaCO3)	5.7	5.7	5.7	6.4	5.5	See narrative text.
Hardness (mg/L as CaCO3)	12.4	13.3	11.5	12	12.45	See narrative text.
Specific Conductance (micromhos per cm)	60	72	65	72	58	See narrative text.
Inorganic Compounds						
Iron (PPM)	0.32	0.33	0.52	0.58	0.27	†† 0.3 PPM
Chlorides (PPM)	13.5	43.0	13.5	13.2	11.8	†† 250 PPM

Notes:

† *MA Inland Class A Water Body Standards* - Minimum standard for surface waters to sustain and protect them from the degradation of their designated use(s).

†† *MA Secondary Drinking Water Standards* - These standards are meant only to serve as a guide, the parameters are not known to cause a health risk but may affect the taste, odor and color of water.

1.) Coliform bacteria concentration reported as number of colony forming units (CFU) per 100 mL.

2.) [1]Historic median values based on 1990 thru 1999 MDC Quabbin Laboratory records. "NC" refers to "No Change". Percent rounded to nearest whole number.

3.) PPM - Parts per million, equivalent to one drop in 10 gallons. 1 PPM = 0.9997 mg/L.

Table B.3. Total Coliform Bacteria Timeline (2001)
Quabbin Reservoir Sample Stations

Sampling Location		Sampling Date														
		6/6/01	6/13/01	6/20/01	6/27/01	7/5/01	7/12/01	7/18/01	7/25/01	8/1/01	8/8/01	8/15/01	8/22/01	8/29/01	9/6/01	9/12/01
Station 202	Surface	0	0	1	1	0	6	134	176	53	6	20	100	340	620	250
	5m	0	0	5	1	3	5	160	640	41	12	40	143	473	647	333
	18m	0	0	8	4	0	6	28	507	460	12	647	1100	1360	125	407
Station "3A"	Surface	0	0	1	1	0	3	750	129	71	18	26	35	135	460	300
	5m	0	0	1	0	1	4	830	310	53	94	40	41	171	470	413
	18m	0	0	3	1	0	0	118	1057	1243	18	2900	2400	1657	63	220
Station 206	Surface	4	TNTC	29	3	0	8	930	94	210	0	427	94	212	260	350
	5m	7	0	12	2	0	13	1120	280	76	12	660	106	330	147	400
	24m	8	0	12	1	2	6	390	1157	1650	0	2650	2150	1300	640	94
Median Result:		0	0	5	1	0	6	390	310	76	12	427	106	340	460	333

Notes: Results reported as number of colonies per 100 mL.

Table B.4. Effects of Thermal Stratification on Water Quality Parameters in an Oligotrophic Reservoir.
Quabbin Reservoir Sample Stations (2001)

	Minimum			Maximum			Geometric Mean		
	(E)	(M)	(H)	(E)	(M)	(H)	(E)	(M)	(H)
Winsor Dam (202)									
Temperature (°C)	16.41	13.45	6.25	24.27	19.98	14.62	19.91	16.49	8.76
pH	6.36	5.86	5.53	6.80	6.81	6.78	6.57	6.49	5.99
Dissolved Oxygen (% Saturation)	90.0	85.2	58.60	109.20	116.3	114.10	97.01	104.61	89.19
Shaft 12 (206)									
Temperature (°C)	15.92	12.44	6.89	24.90	23.33	15.20	20.10	16.16	9.79
pH	6.22	5.76	5.52	6.74	6.77	6.74	6.56	6.40	6.00
Dissolved Oxygen (% Saturation)	86.30	76.5	43.80	103.40	116.7	114.40	95.23	100.13	84.71
Den Hill									
Temperature (°C)	15.19	11.61	7.71	24.72	21.38	14.83	18.79	16.13	10.42
pH	6.05	5.49	5.41	6.76	6.58	6.42	6.52	6.14	5.70
Dissolved Oxygen (% Saturation)	77.40	45.1	7.30	126.80	111.4	103.40	97.65	91.6	57.91

Notes:
(E) - Epilimnion
(M) – Metalimnion
(H) - Hypolimnion

Source: MDC Quabbin Laboratory, 2001

APPENDIX C
QUARTERLY NUTRIENT RESULTS: 2001

Results of Quarterly Nutrient Sampling:
Nitrate (mg/L)

I.D.	Sampling Station	Sampling Date						
		04/24/01	07/25/01	10/16/01	12/19/01	Median	Average	Max.
MD28	WD/202 (E)	0.023	*0.005*	0.013	0.017	0.015	0.015	0.023
MD29	WD/202 (M)	0.024	*0.005*	0.008	0.016	0.012	0.013	0.024
MD30	WD/202 (H)	0.025	0.027	0.039	0.023	0.026	0.028	0.039
MD37	MP/206 (E)	0.018	*0.005*	*0.005*	0.009	0.007	0.009	0.018
MD38	MP/206 (M)	0.017	*0.005*	0.010	0.011	0.011	0.011	0.017
MD39	MP/206 (H)	0.017	0.016	0.022	0.009	0.017	0.016	0.022
MD40	Den Hill (E)	0.045	*0.005*	*0.005*	0.015	0.010	0.017	0.045
MD41	Den Hill (M)	0.058	*0.005*	0.009	0.015	0.012	0.022	0.058
MD42	Den Hill (H)	0.060	0.049	0.074	0.015	0.055	0.050	0.074

'Note: values show in italix are <MDL

Results of Quarterly Nutrient Sampling:
TKN (mg/L)

I.D.	Sampling Station	Sampling Date						
		04/24/01	07/25/01	10/16/01	12/19/01	Median	Average	Max.
MD28	WD/202 (E)	1.000	0.246	0.627	1.110	0.814	0.746	1.110
MD29	WD/202 (M)	0.218	0.228	0.479	0.636	0.354	0.390	0.636
MD30	WD/202 (H)	0.216	0.260	0.456	1.140	0.358	0.518	1.140
MD37	MP/206 (E)	*0.20*	0.211	0.465	0.762	0.338	0.409	0.762
MD38	MP/206 (M)	0.266	0.221	0.759	0.608	0.437	0.464	0.759
MD39	MP/206 (H)	*0.20*	0.339	0.829	0.526	0.432	0.473	0.829
MD40	Den Hill (E)	0.232	0.378	0.580	0.661	0.479	0.463	0.661
MD41	Den Hill (M)	0.538	0.420	0.358	0.658	0.479	0.493	0.658
MD42	Den Hill (H)	0.423	0.234	0.622	1.000	0.523	0.570	1.000

Note: values show in italix are <MDL

Results of Quarterly Nutrient Sampling:
Silica (mg/L)

I.D.	Sampling Station	Sampling Date				Median	Average	Max.
		04/24/01	07/25/01	10/16/01	12/19/01			
MD28	WD/202 (E)	1.73	1.26	1.19	1.37	1.32	1.39	1.73
MD29	WD/202 (M)	1.70	1.22	1.28	1.35	1.32	1.39	1.70
MD30	WD/202 (H)	1.74	1.77	2.15	1.37	1.76	1.76	2.15
MD37	MP/206 (E)	1.52	1.22	1.16	1.24	1.23	1.29	1.52
MD38	MP/206 (M)	1.55	1.12	1.27	1.25	1.26	1.30	1.55
MD39	MP/206 (H)	1.51	1.48	1.67	1.24	1.50	1.48	1.67
MD40	Den Hill (E)	4.64	1.10	1.26	1.44	1.35	2.11	4.64
MD41	Den Hill (M)	4.37	1.08	1.31	1.44	1.38	2.05	4.37
MD42	Den Hill (H)	4.25	3.12	4.13	1.43	3.63	3.23	4.25

Results of Quarterly Nutrient Sampling:
Alkalinity (mg/L as $CaCO_2$)

I.D.	Sampling Station	Sampling Date				Median	Average	Max.
		04/24/01	07/25/01	10/16/01	12/19/01			
MD28	WD/202 (E)	2.72	2.56	2.86	2.84	2.78	2.74	2.86
MD29	WD/202 (M)	2.76	2.58	2.56	2.74	2.66	2.66	2.76
MD30	WD/202 (H)	2.76	2.74	2.82	2.50	2.75	2.71	2.82
MD37	MP/206 (E)	2.74	2.74	2.72	2.76	2.74	2.74	2.76
MD38	MP/206 (M)	2.78	2.56	2.80	2.76	2.77	2.72	2.80
MD39	MP/206 (H)	2.74	2.82	2.72	2.86	2.78	2.78	2.86
MD40	Den Hill (E)	2.12	2.86	3.08	3.24	2.97	2.82	3.24
MD41	Den Hill (M)	2.70	2.70	2.70	3.04	2.70	2.79	3.04
MD42	Den Hill (H)	2.72	2.80	4.52	3.10	2.95	3.28	4.52

Results of Quarterly Nutrient Sampling:
UV254 (A/cm)

I.D.	Sampling Station	Sampling Date				Median	Average	Max.
		04/24/01	07/25/01	10/16/01	12/19/01			
MD28	WD/202 (E)	0.021	0.021	0.019	0.019	0.020	0.020	0.021
MD29	WD/202 (M)	0.021	0.024	0.024	0.019	0.022	0.022	0.024
MD30	WD/202 (H)	0.021	0.021	0.020	0.020	0.020	0.020	0.021
MD37	MP/206 (E)	0.021	0.021	0.020	0.019	0.020	0.020	0.021
MD38	MP/206 (M)	0.021	0.027	0.022	0.020	0.022	0.022	0.027
MD39	MP/206 (H)	0.022	0.022	0.023	0.020	0.022	0.022	0.023
MD40	Den Hill (E)	0.112	0.034	0.025	0.027	0.030	0.050	0.112
MD41	Den Hill (M)	0.090	0.033	0.027	0.027	0.030	0.044	0.090
MD42	Den Hill (H)	0.085	0.053	0.081	0.028	0.067	0.062	0.085

Results of Quarterly Nutrient Sampling:
Total Phosphorus (mg/L)

I.D.	Sampling Station	Sampling Date				Median	Average	Max.
		04/24/01	07/25/01	10/16/01	12/19/01			
MD28	WD/202 (E)	0.010	0.006	0.009	0.008	0.008	0.008	0.010
MD29	WD/202 (M)	0.013	0.006	0.010	0.010	0.010	0.010	0.013
MD30	WD/202 (H)	0.008	0.006	0.007	0.009	0.008	0.008	0.009
MD37	MP/206 (E)	0.007	*0.005*	*0.005*	0.006	0.006	0.006	0.007
MD38	MP/206 (M)	0.007	0.006	0.006	*0.005*	0.006	0.006	0.007
MD39	MP/206 (H)	0.008	0.012	0.006	0.006	0.007	0.008	0.012
MD40	Den Hill (E)	0.015	0.009	0.005	0.008	0.009	0.009	0.015
MD41	Den Hill (M)	0.015	0.013	0.005	0.007	0.010	0.010	0.015
MD42	Den Hill (H)	0.015	0.015	0.015	0.009	0.015	0.014	0.015

'Note: values show in italix are <MDL

Results of Quarterly Nutrient Sampling:
Ammonia (mg/L)

I.D.	Sampling Station	Sampling Date				Median	Average	Max.
		04/24/01	07/25/01	10/16/01	12/19/01			
MD28	WD/202 (E)	*0.005*	*0.005*	*0.005*	0.006	0.005	0.005	0.006
MD29	WD/202 (M)	*0.005*	*0.005*	0.005	0.007	0.005	0.005	0.007
MD30	WD/202 (H)	*0.005*	0.021	0.028	0.008	0.014	0.016	0.028
MD37	MP/206 (E)	*0.005*	*0.005*	*0.005*	*0.005*	0.005	0.005	0.005
MD38	MP/206 (M)	*0.005*	*0.005*	0.006	*0.005*	0.005	0.005	0.006
MD39	MP/206 (H)	*0.005*	0.016	0.025	*0.005*	0.010	0.013	0.025
MD40	Den Hill (E)	*0.005*	*0.005*	*0.005*	*0.005*	0.005	0.005	0.005
MD41	Den Hill (M)	0.007	*0.005*	0.010	*0.005*	0.006	0.007	0.010
MD42	Den Hill (H)	0.008	0.018	0.084	*0.005*	0.013	0.029	0.084

'Note: values show in italix are <MDL

Table X - Quabbin Reservoir Nutrient Concentrations:
Comparison of Ranges from 1998-00 Database[1] to Results from 2001 Quarterly Sampling [2]

Sampling Station [3]	Ammonia (NH3; ug/L)		Nitrate (NO3; ug/L)		Silica (SIO2; mg/L)	
	1998-00	Quarterly'01	1998-00	Quarterly'01	1998-00	Quarterly'01
WD/202 (E)	<5 - 10	<5 - 6	<5 - 18	<5 - 23	1.14 - 1.61	1.19 - 1.73
WD/202 (M)	<5 - 29	<5 - 7	<5 - 27	<5 - 24	1.08 - 1.79	1.22 - 1.70
WD/202 (H)	<5 - 53	<5 - 28	<5 - 54	23 - 39	1.18 - 2.58	1.37 - 2.15
MP/206 (E)	<5 - 8	<5	<5 - 20	<5 - 18	1.08 - 1.50	1.16 - 1.52
MP/206 (M)	<5 - 34	<5 - 6	<5 - 44	<5 - 17	0.87 - 1.56	1.12 - 1.55
MP/206 (H)	<5 - 67	<5 - 25	<5 - 29	9 - 22	1.09 - 1.80	1.24 - 1.67
Den Hill (E)	<5 - 16	<5	<5 - 27	<5 - 45	0.98 - 2.76	1.10 - 4.64
Den Hill (M)	<5 - 16	<5 - 10	<5 - 17	<5 - 58	0.86 - 2.81	1.08 - 4.37
Den Hill (H)	<5 - 71	<5 - 84	<5 - 40 [4]	15 - 74	1.18 - 3.02	1.43 - 4.25

Sampling Station [3]	Total Phosphorus (ug/L)		UV254 (Absorbance/cm)	
	1998-00	Quarterly'01	Quarterly'00	Quarterly'01
WD/202 (E)	<5 - 12	6 - 10	0.020 - 0.022	0.019 - 0.021
WD/202 (M)	<5 - 9	6 - 13	0.021 - 0.025	0.019 - 0.024
WD/202 (H)	<5 - 44	6 - 9	0.020 - 0.024	0.020 - 0.021
MP/206 (E)	<5 - 12	<5 - 7	0.022 - 0.024	0.019 - 0.021
MP/206 (M)	<5 - 8	<5 - 7	0.024 - 0.026	0.020 - 0.027
MP/206 (H)	<5 - 9	6 - 12	0.021 - 0.024	0.020 - 0.023
Den Hill (E)	<5 - 11	5 - 15	0.039 - 0.066	0.025 - 0.112
Den Hill (M)	<5 - 15	5 - 15	0.039 - 0.058	0.027 - 0.090
Den Hill (H)	<5 - 12	9 - 15	0.044 - 0.061	0.028 - 0.085

Notes:

(1) 1998-00 database composed of 1998-99 year of monthly sampling and subsequent quarterly sampling conducted December 1999, May 2000, August 2000, October 2000, and January 2001 except for measurement of UV254 initiated in 2000 quarterly sampling

(2) 2001 quarterly sampling conducted April, July, October, and December

(3) Water column locations are as follow: E = epilimnion/surface, M = metalimnion/middle, H = hypolimnion/bottom

(4) Anomalous nitrate value of 158 ug/L omitted

APPENDIX D
WATER QUALITY DATA TABLES

QUABBIN LABORATORY RECORDS 2001

(206) QUABBIN RESERVOIR @ SHAFT #12

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.2				6.6	4.1	2.3	12.4	87	1		42	0	0
01/08	0.2				6.6	4.1	2.5	13.0	91	1		42	0	0
01/16	0.2				6.6	4.1	2.6	12.8	90	1		42	0	0
01/22	0.2				6.7	4.1	2.4	14.1	99	1		42	0	0
01/29	0.3				6.6	4.0	2.4	13.0	91	1		42	0	0
02/05	0.2	5	5.4	8.1	6.7	4.3	2.5	13.3	93	1	0.03	40	0	0
02/12	0.2				6.6	4.2	2.5	13.1	92	1		42	0	0
02/20	0.2				6.7	4.3	2.5	14.1	102	2		40	0	0
02/26	0.3				6.7	4.3	2.5	12.8	93	2		42	0	0
03/05	0.2				6.8	4.2	2.5	12.7	92	2		42	0	0
03/12	0.2				6.6	4.2	2.6	12.5	90	2		42	3	0
03/19	0.2				6.6	4.2	2.5	14.0	101	2		42	0	0
03/26	0.2				6.5	4.0	2.3	12.5	88	1		38	0	0
04/09	0.2				5.2	1.2	-0.2	12.2	86	1		12	1	0
04/17	0.2				6.6	4.1	2.4	12.5	98	5		42	3	0
04/23	0.2				6.6	4.3	2.6	11.0	91	7		42	24	0
04/30	0.2				6.6	4.2	2.7	11.6	96	7		42	10	0
05/07	0.3				6.7	4.0	2.4	11.3	100	10		42	4	0
05/14	0.3	5	5.2	7.5	6.7	4.2	2.4	9.9	89	11	0.03	42	16	0
05/21	0.3				6.7	4.2	2.5	10.6	100	13		42	TNTC	0
05/29	0.3				6.7	4.2	2.5	10.1	99	15		42	657	1
06/04	0.3				6.7	4.0	2.4	9.9	98	15		42	250	0
06/11	0.3				6.6	4.2	2.5	9.5	102	19		42	118	0
06/18	0.2				6.7	3.9	2.4	9.1	99	20		42	18	4
06/25	0.2				6.8	3.9	2.3	8.8	99	22		42	260	0
07/02	0.3				6.7	3.9	2.3	8.7	98	22		42	567	2
07/09	0.2				6.7	4.0	2.5	8.4	95	22		42	100	0
07/16	0.2				6.7	3.8	2.3	8.5	96	22		42	1,414	0
07/23	0.2				6.7	4.1	2.4	8.1	95	24		42	220	0
07/30	0.2				6.8	4.0	2.5	8.3	95	23		42	0	0
08/06	0.2	5	5.4	7.2	6.7	4.1	2.4	7.7	94	26	0.04	42	23	0
08/13	0.2				6.8	4.0	2.5	8.1	96	25		42	33	0
08/20	0.3				6.8	4.1	2.6	8.0	95	25		42	135	0
08/27	0.2				6.7	4.1	2.4	8.0	94	24		42	88	0
09/04	0.3				6.8	4.2	2.6	7.9	91	23		42	533	0
09/10	0.3				6.7	4.2	2.6	8.1	93	23		42	680	0
09/17	0.3				6.8	4.2	2.6	8.5	96	22		42	387	0
09/24	0.4				6.7	4.2	2.7	8.5	94	21		42	400	0
10/01	0.4				6.7	4.3	2.8	8.7	91	18		42	270	0
10/09	0.3				6.6	4.1	2.6	9.0	93	17		42	20	0
10/15	0.3				6.6	4.2	2.5	8.9	90	16		42	35	0
10/22	0.4				6.6	4.2	2.7	9.0	91	16		42	TNTC	0
10/29	0.3				6.7	4.2	2.5	9.6	91	13		42	156	0
11/05	0.4				6.7	4.3	2.7	9.9	93	13		42	21	0
11/13	0.3	5	5.8	7.5	6.7	4.3	2.5	10.2	90	10	0.04	42	22	0
11/19	0.3				6.7	4.4	2.7	10.1	89	10		42	4	0
11/26	0.4				6.7	4.4	2.7	10.2	92	11		43	114	0
12/03	0.3				6.7	4.2	2.5	10.2	90	10		42	3	0
12/10	0.3				6.7	4.4	2.7	11.0	95	9		42	10	0
12/17	0.2				6.6	4.3	2.6	10.7	90	8		42	7	0
12/26	0.3				6.7	4.3	2.6	11.2	90	6		42	2	0
AVG.	0.3	5	5.5	7.6	6.7	4.1	2.5	10.4	94	12	0.04	41	135	0
MAX.	0.4	5	5.8	8.1	6.8	4.4	2.8	14.1	102	26	0.04	43	TNTC	4
MIN.	0.2	5	5.2	7.2	5.2	1.2	-0.2	7.7	86	1	0.03	12	0	0
MEDIAN	0.3	5	5.4	7.5	6.7	4.2	2.5	10.1	93	11	0.04	42	18	0

5/21 and 10/22 THE TNTC FOR TOTAL COLIFORM WAS EXCLUDED WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
01/02	0.3				6.6	4.2	2.5	11.7	90	4		42	AM	2	0
01/02													PM		0
01/03													AM	0	0
01/03													PM		0
01/04													AM	2	0
01/04													PM		0
01/05													AM		0
01/05													PM		0
01/06													PM		0
01/07													PM		0
01/08	0.3				6.6	4.2	2.6	11.8	88	3		42	AM	0	0
01/08													PM		0
01/09													AM	1	0
01/09													PM		0
01/10													AM	0	0
01/10													PM		1
01/11													AM	0	0
01/11													PM		1
01/12													AM		0
01/12													PM	0	0
01/13													PM		0
01/14													PM		0
01/16	0.3				6.6	4.2	2.6	11.8	88	3		42	AM	0	0
01/16													PM		1
01/17													AM	0	0
01/17													PM		0
01/18													AM	0	0
01/18													PM		0
01/19													AM		0
01/19													PM	0	0
01/20													PM		0
01/21													PM		0
01/22	0.2				6.6	4.1	2.4	15.0	108	2		42	AM	0	0
01/22													PM		0
01/23													AM	3	0
01/24													AM	0	0
01/25													AM	1	0
01/26													AM	0	0
01/27													AM	0	0
01/28													PM	0	0
01/29	0.3				6.6	4.0	2.4	11.8	88	3		42	AM	0	1
01/30													AM	0	0
01/31													AM	0	0
02/01													AM	0	0
02/02													AM	2	0
02/03													AM	0	0
02/04													AM		0
02/05	0.4	5	5.6	7.9	6.6	4.6	2.7	12.8	95	3	0.04	42	AM	4	0
02/06													AM	0	0
02/07													AM	1	0
02/08													AM	0	0
02/09													AM	0	0
02/10													AM	1	0

QUABBIN LABORATORY RECORDS 2001

(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
02/11													AM	1	0
02/12	0.2				6.6	4.3	2.6	12.2	91	3		42	AM	0	0
02/13													AM	0	0
02/14													AM	0	0
02/15													AM	1	0
02/16													AM	0	0
02/17													AM	1	0
02/18													AM	0	0
02/19													AM	0	0
02/20	0.2				6.6	4.3	2.5	14.5	105	2		42	AM	1	0
02/21													AM	0	0
02/22													AM	0	0
02/23													AM	0	0
02/24													AM	0	0
02/25													AM	0	0
02/26	0.2				6.6	4.3	2.6	12.2	91	3		42	AM	0	0
02/27													AM	0	0
02/28													AM	0	0
03/01													AM	0	0
03/02													AM	0	0
03/03													AM	0	0
03/04													AM	1	0
03/05	0.4				6.6	4.3	2.5	12.3	92	3		42	AM	0	0
03/06													AM	0	0
03/07													AM	0	0
03/08													AM	0	0
03/09													AM	0	0
03/10													AM	1	0
03/11													AM	3	0
03/12	0.2				6.6	4.2	2.5	12.0	89	3		42	AM	3	0
03/13													AM	0	0
03/14													AM	0	0
03/15													AM	6	0
03/16													AM	0	0
03/17													AM	0	0
03/18													AM	0	0
03/19	0.2				6.6	4.3	2.4	14.4	104	2		42	AM	0	0
03/20													AM	0	0
03/21													AM	0	0
03/22													AM	0	0
03/23													AM	0	0
03/24													AM	1	1
03/25													AM	3	0
03/26	0.3				6.5	4.3	2.5	12.0	89	3		42	AM	1	1
03/27													AM	2	1
03/28													AM	1	1
03/29													AM	0	1
03/29													PM		0
03/30													AM	0	0
03/31													AM	3	3
04/01													AM	7	15
04/02	0.4				6.5	4.0	2.5	12.2	91	3		42	AM	10	6
04/02													PM		3

QUABBIN LABORATORY RECORDS 2001

(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
04/03													AM	5	4
04/03													PM		4
04/04													AM	13	3
04/04													PM		1
04/05													AM	2	2
04/05													PM		4
04/06													AM	1	2
04/06													PM		1
04/07													PM		1
04/08													PM		1
04/09	0.2				6.5	3.9	2.3	12.0	92	4		42	AM	1	1
04/09													PM		1
04/10													AM	3	0
04/10													PM		0
04/11													AM	3	0
04/11													PM		0
04/12													AM	0	1
04/12													PM		0
04/13													AM		0
04/13													PM		1
04/14													PM		0
04/15													PM	1	0
04/16													PM	0	0
04/17	0.2				6.6	4.1	2.3	13.0	102	5		42	AM	1	0
04/17													PM		0
04/18													AM	5	0
04/18													PM		0
04/19													AM	0	0
04/19													PM		0
04/20													AM	0	0
04/20													PM	0	0
04/21													PM		0
04/22													PM		0
04/23	0.2				6.6	4.1	2.5	11.0	88	6		42	AM	0	0
04/23													PM		0
04/24													AM	2	0
04/24													PM		0
04/25													AM	0	0
04/25													PM		0
04/26													AM	1	0
04/26													PM		0
04/27													AM	1	0
04/27													PM		0
04/28													PM		0
04/29													PM		0
04/30	0.3				6.6	4.0	2.5	11.4	94	7		42	AM	1	0
04/30													PM		0
05/01													AM	2	0
05/01													PM		0
05/02													AM	0	0
05/02													PM		0
05/03													AM	2	0
05/04													AM	2	1

QUABBIN LABORATORY RECORDS 2001

(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
05/05													AM	2	0
05/06													AM	13	0
05/07	0.3				6.7	3.9	2.3	11.8	100	8		42	AM	0	0
05/08													AM	0	0
05/09													AM	0	0
05/10													AM	1	0
05/11													AM	2	0
05/12													AM	0	0
05/13													AM	13	0
05/14	0.3	5	5.3	7.6	6.7	4.2	2.4	12.4	107	9	0.04	42	AM	1	1
05/15													AM	0	0
05/16													AM	0	0
05/17													AM	4	0
05/18													AM	4	0
05/19													AM	2	0
05/20													AM	0	0
05/21	0.3				6.7	4.1	2.4	11.4	99	9		42	AM	0	0
05/22													AM	6	0
05/23													AM	6	0
05/24													AM	0	1
05/25													AM	3	0
05/26													AM	9	0
05/27													AM	1	0
05/28													AM	9	0
05/29	0.3				6.7	4.2	2.5	11.3	100	10		42	AM	2	0
05/30													AM	0	0
05/31													AM	0	0
06/01													AM	2	0
06/02													AM	3	0
06/03													AM	0	0
06/04	0.3				6.7	4.0	2.4	11.4	101	10		42	AM	0	0
06/05													AM	0	0
06/06													AM	0	0
06/07													AM	2	0
06/08													AM	0	0
06/09													AM	2	0
06/10													AM	2	0
06/11	0.3				6.7	4.1	2.5	12.2	108	10		42	AM	1	0
06/12													AM	0	0
06/13													AM	0	0
06/14													AM	1	0
06/15													AM	1	0
06/16													AM	4	0
06/17													AM	1	0
06/18	0.3				6.7	3.9	2.4	11.1	100	11		42	AM	0	0
06/19													AM	0	0
06/20													AM	7	0
06/21													AM	2	0
06/22													AM	20	0
06/23													AM	5	0
06/24													AM	4	0
06/25	0.3				6.7	3.9	2.3	11.4	103	11		42	AM	12	0
06/26													AM	0	0

QUABBIN LABORATORY RECORDS 2001

(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
06/27													AM	0	0
06/28													AM	1	0
06/29													AM	2	0
06/30													PM	3	0
07/01													PM	1	0
07/02	0.3				6.7	4.0	2.4	11.4	103	11		42	AM	0	0
07/03													AM	1	0
07/04													AM	1	0
07/05													AM	0	0
07/06													AM	3	0
07/07													PM	2	0
07/08													PM	3	0
07/09	0.3				6.6	3.9	2.4	12.0	108	11		42	AM	0	0
07/10													AM	2	0
07/11													AM	4	0
07/12													AM	1	0
07/13													AM	1	0
07/14													PM	0	0
07/15													PM	1	0
07/16	0.3				6.7	4.2	2.6	11.1	100	11		42	AM	0	0
07/17													AM	2	0
07/18													AM	5	0
07/19													AM	5	0
07/20													AM	2	0
07/21													AM	0	0
07/22													PM	29	0
07/23	0.3				6.7	4.3	2.7	11.1	100	11		42	AM	12	0
07/24													AM	42	0
07/25													AM	212	0
07/26													AM	22	0
07/27													AM	112	0
07/28													AM	332	
07/29													PM	184	0
07/30	0.3				6.8	4.1	2.4	11.2	103	12		42	AM	84	0
07/31													AM	155	0
08/01													AM	220	0
08/02													AM	718	0
08/03													AM	250	0
08/04													PM	197	0
08/05													PM	410	0
08/06	0.3	5	5.8	7.4	6.7	4.2	2.5	11.6	107	12	0.04	42	AM	173	0
08/07													AM	306	0
08/08													AM	343	0
08/09													AM	34	0
08/10													AM	347	0
08/11													AM	77	0
08/12													PM	460	0
08/13	0.3				6.8	4.0	2.5	11.0	104	13		42	AM	54	0
08/14													AM	437	0
08/15													AM	314	0
08/16													AM	429	0
08/17													AM	257	0
08/18													AM	391	0

QUABBIN LABORATORY RECORDS 2001

(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
08/19													PM	1,120	0
08/20	0.5				6.8	4.1	2.6	10.8	102	13		42	AM	118	0
08/21													AM	700	0
08/22													AM	1,100	0
08/23													AM	1,120	0
08/24													AM	940	0
08/25													AM	1,850	0
08/26													AM	2,050	0
08/27	0.3				6.7	4.3	2.7	10.9	103	13		42	AM	243	0
08/28													AM	1,100	1
08/29													AM	640	0
08/30													AM	943	0
08/31													AM	680	0
09/01													AM	980	1
09/02													AM	1,186	0
09/03													AM	1,029	0
09/04	0.4				6.8	4.3	2.7	11.3	107	13		42	AM	500	0
09/05													AM	500	0
09/06													AM	290	0
09/07													AM	94	0
09/08													AM	320	0
09/09													AM	100	0
09/10	0.3				6.8	4.3	2.6	10.8	104	14		42	AM	35	0
09/11													AM	165	0
09/12													AM	220	0
09/13													AM	330	0
09/14													AM	270	0
09/15													AM	480	0
09/16													AM	1,000	0
09/17	0.3				6.7	4.3	2.7	10.9	105	14		42	AM	547	0
09/18													AM	5,100	0
09/19													AM	1,024	0
09/19													PM	94	
09/20													AM	41	0
09/21													AM	230	0
09/22													AM	300	0
09/23													AM	41	0
09/24	0.3				6.6	4.2	2.7	10.7	103	14		42	AM	165	0
09/25													AM	53	0
09/26													AM	857	0
09/27													AM	693	0
09/28													AM	1,086	0
09/29													AM	333	2
09/30													AM	172	0
10/01	0.3				6.7	4.2	2.6	8.7	91	18		42	AM	59	2
10/02													AM	240	0
10/03													AM	373	0
10/04													AM	110	0
10/05													AM	54	0
10/06													AM	11	0
10/07													AM	6	0
10/08													AM	54	0
10/09	0.3				6.6	4.2	2.7	8.2	82	16		42	AM	49	0

QUABBIN LABORATORY RECORDS 2001

(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
10/10													AM	120	0
10/11													AM	29	0
10/12													AM	193	0
10/13													AM	173	0
10/14													AM	66	0
10/15	0.3				6.6	4.2	2.6	9.0	91	16		42	AM	67	2
10/16													AM	6	1
10/17													AM	9	0
10/18													AM	8	0
10/19													AM	22	0
10/20													AM	5	0
10/21													AM	31	0
10/22	0.4				6.5	4.2	2.7	8.9	88	15		42	AM	3	0
10/23													AM	11	0
10/24													AM	14	0
10/25													AM	46	1
10/26													AM	71	0
10/27													AM	64	0
10/28													AM	62	0
10/29	0.3				6.6	4.2	2.6	9.7	94	14		42	AM	53	0
10/29													PM		0
10/30													AM	33	0
10/31													AM	21	0
11/01													AM	37	1
11/02													AM	36	0
11/03													AM	12	0
11/04													AM	42	0
11/05	0.3				6.6	4.3	2.6	9.4	89	13		42	AM	11	0
11/06													AM	17	0
11/07													AM	15	0
11/08													AM	19	0
11/09													AM	TNTC	0
11/10													AM	TNTC	0
11/11													AM	17	0
11/12													AM	21	0
11/13	0.3	5	5.9	7.5	6.6	4.3	2.4	9.5	88	12	0.04	42	AM	11	0
11/14													AM	1	0
11/15													AM	7	0
11/16													AM	2	0
11/17													AM	11	1
11/18													AM	4	2
11/19	0.3				6.6	4.4	2.7	9.4	85	11		42	AM	6	1
11/20													AM	5	0
11/21													AM	3	0
11/22													AM	6	0
11/23													AM	2	0
11/24													AM	0	0
11/25													AM	6	0
11/26	0.3				6.6	4.4	2.7	9.6	87	11		42	AM	11	3
11/27													AM	12	0
11/28													AM	4	1
11/29													AM	2	1
11/30													AM	0	0

QUABBIN LABORATORY RECORDS 2001

(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
12/01													AM	17	0
12/02													AM	1	0
12/03	0.9				6.6	4.3	2.6	9.6	85	10		42	AM	3	1
12/04													AM	3	0
12/04	0.3												PM		0
12/05													AM	3	0
12/05													PM		0
12/06													AM	2	0
12/06													PM		1
12/07													AM	5	3
12/07													PM		0
12/08													PM	4	2
12/09													PM	1	1
12/10	0.3				6.6	4.4	2.7	10.0	86	9		42	AM	3	1
12/10													PM		0
12/11													AM	4	2
12/11													PM		0
12/12													AM	3	0
12/13													AM	4	0
12/14													AM	0	0
12/15													PM	0	0
12/16													PM		0
12/17	0.3				6.6	4.4	2.8	10.1	87	9		42	AM	1	1
12/17													PM		0
12/18													AM	0	0
12/18													PM		0
12/19													AM	4	1
12/19													PM		0
12/20													AM	1	0
12/20													PM		0
12/21													AM	0	0
12/21													PM		0
12/22													PM	0	0
12/23													PM		0
12/24													AM	5	2
12/25													AM	0	0
12/26	0.3				6.6	4.4	2.7	10.7	90	8		42	AM	1	1
12/26													PM		0
12/27													AM	1	0
12/27													PM		0
12/28													AM	2	0
12/28													PM		5
12/29													PM		6
12/30													PM	1	0
12/31													AM	1	1
AVG.	0.3	5	5.7	7.6	6.6	4.2	2.5	11.2	96	9	0.04	42		117	0
MAX.	0.9	5	5.9	7.9	6.8	4.6	2.8	15.0	108	18	0.04	42		TNTC	15
MIN.	0.2	5	5.3	7.4	6.5	3.9	2.3	8.2	82	2	0.04	42		0	0
MEDIAN	0.3	5	5.7	7.6	6.6	4.2	2.5	11.4	95	10	0.04	42		3	0

11/9 and 11/10 THE TNTC FOR TOTAL COLIFORM WAS EXCLUDED WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

(211) WEST BR. OF SWIFT RIVER -- RT. 202

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.4				6.4	5.1	3.0	13.2	90	0		53	250	1
01/22	0.3				6.3	4.8	2.8	15.4	105	0		52	340	1
02/05	0.5	13	8.5	9.1	6.3	4.8	2.8	13.7	94	0	0.10	55	270	1
02/20	0.3				6.4	5.3	3.6	14.2	100	1		60	148	0
03/05	0.4				6.5	6.1	4.2	13.2	90	0		68	200	38
03/08														6
03/19	0.3				6.4	4.9	2.9	14.1	102	2		70	128	6
04/02	0.6				6.5	5.8	3.7	12.2	88	2		92	126	9
04/17	0.5				6.2	4.0	2.1	12.6	97	4		55	114	20
04/30	0.4				6.5	6.5	4.7	11.2	90	6		130	330	2
05/14	0.4	15	11.0	15.5	6.5	7.2	5.2	10.2	90	10	0.13	130	620	6
05/29	0.4				6.2	3.7	1.6	9.8	90	12		60	1,186	38
06/11	0.4				6.5	6.9	5.1	9.5	92	14		102	767	35
06/25	0.5				6.1	3.9	1.8	8.9	92	17		50	2,100	116
07/09	0.5				6.3	5.8	4.0	8.9	90	16		73	1,750	34
07/23	0.5				6.4	7.3	5.5	8.0	82	17		87	733	18
08/06	0.6	35	17.0	12.3	6.4	7.6	5.5	6.9	74	19	0.47	90	1,667	31
08/20	0.9				6.4	7.5	5.6	7.6	80	18		85	1,467	50
09/04	0.6				6.4	9.4	7.8	8.5	82	14		110	2,100	21
09/17	0.6				6.4	7.5	5.6	9.2	81	10		93	333	5
10/01	0.7				6.3	6.6	4.6	9.2	83	11		100	800	6
10/15	0.6				6.2	7.5	6.0	8.2	76	12		88	2,400	35
10/29	0.5				6.2	7.3	5.4	10.0	77	4		115	286	0
11/13	0.4	18	11.2	10.2	6.3	6.0	4.2	12.6	91	2	0.23	70	230	4
11/26	0.6				6.3	6.1	4.4	10.2	84	7		85	413	4
12/10	0.4				6.2	4.7	2.8	13.1	92	1		72	180	0
12/26	0.4				6.2	4.0	2.3	13.0	89	0		60	114	2
AVG.	0.5	20	11.9	11.8	6.3	6.0	4.1	10.9	89	8	0.23	81	733	18
MAX.	0.9	35	17.0	15.5	6.5	9.4	7.8	15.4	105	19	0.47	130	2,400	116
MIN.	0.3	13	8.5	9.1	6.1	3.7	1.6	6.9	74	0	0.10	50	114	0
MEDIAN	0.5	17	11.1	11.3	6.4	6.1	4.2	10.2	90	7	0.18	79	337	6

QUABBIN LABORATORY RECORDS 2001

(213) MIDDLE BR. OF SWIFT RIVER @ GATE #30

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.6				6.1	6.9	4.6	9.5	65	0		77	100	6
01/22	0.6				6.2	8.0	6.0	11.3	77	0		78	184	8
02/05	0.6	17	13.8	13.6	6.2	7.6	5.5	10.6	73	0	0.17	80	148	0
02/20	0.6				6.2	7.5	5.5	11.7	80	0		77	48	1
03/05	0.7				6.3	7.9	5.9	10.4	71	0		83	72	4
03/19	0.5				6.3	7.0	5.1	12.0	84	1		78	104	6
04/02	0.5				6.2	5.2	3.3	10.8	76	1		90	90	4
04/17	0.3				6.0	3.9	1.9	9.7	78	6		70	86	3
04/30	0.5				6.2	6.1	4.0	8.0	71	10		98	TNTC	40
05/14	0.9	43	15.5	15.2	6.3	9.7	7.6	9.6	97	16	0.38	103	1,100	68
05/29	0.7				6.2	7.5	5.3	5.8	57	15		75	600	60
06/11	0.7				6.2	8.7	6.8	6.1	64	18		90	700	37
06/25	0.9				6.1	7.7	5.5	3.8	41	20		62	933	160
07/09	1.2				6.1	10.0	8.3	9.6	103	19		83	133	26
07/23	0.9				6.1	10.9	9.1	4.0	44	21		90	1,000	12
08/06	1.2	50	17.5	18.2	6.3	13.9	12.1	4.2	48	23	0.77	98	800	27
08/20	0.9				6.2	14.1	12.2	3.2	36	22		97	467	84
09/04	0.9				6.4	14.1	12.3	5.0	52	18		120	867	20
09/17	0.8				6.3	12.3	10.5	4.6	44	14		113	333	7
10/01	0.8				6.2	10.7	8.9	5.7	53	12		97	200	17
10/15	0.7				6.2	10.6	9.0	6.0	57	13		125	5,000	TNTC
10/29	0.8				6.2	11.3	9.3	6.0	48	6		95	400	3
11/13	0.8	28	17.0	16.5	6.4	10.4	8.7	10.0	77	4	0.27	95	66	5
11/26	0.9				6.3	11.5	9.4	7.8	63	6		100	507	20
12/10	0.8				6.4	10.5	8.3	10.0	74	3		90	140	3
12/26	0.7				6.1	8.0	6.2	9.4	66	1		83	220	7
AVG.	0.8	35	16.0	15.9	6.2	9.3	7.4	7.9	65	10	0.40	90	585	32
MAX.	1.2	50	17.5	18.2	6.4	14.1	12.3	12.0	103	23	0.77	125	TNTC	TNTC
MIN.	0.3	17	13.8	13.6	6.0	3.9	1.9	3.2	36	0	0.17	62	48	0
MEDIAN	0.8	36	16.3	15.9	6.2	9.2	7.2	8.7	66	8	0.33	90	277	10

4/30 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 2,277%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.
10/15 TOTAL COLIFORM RESULT (WITH THE AVERAGE YEARLY DECREASE OF 96%) WAS USED FOR FECAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

(216) EAST BR. OF SWIFT RIVER @ RT. 32A

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.6				6.5	5.7	3.8	13.4	92	0		73	240	16
01/22	0.6				6.6	7.0	5.0	15.4	105	0		78	TNTC	30
02/05	0.7	47	15.2	12.5	6.6	6.5	4.5	14.0	98	1	0.35	80	260	10
02/20	0.6				6.6	5.8	3.7	15.2	104	0		83	110	4
03/05	0.7				6.6	6.2	4.4	13.4	94	1		90	132	3
03/19	0.5				6.6	5.9	4.0	14.9	105	1		98	114	8
04/02	0.5				6.3	4.3	2.4	12.8	93	2		98	96	19
04/17	0.4				6.1	3.2	1.2	11.9	93	5		53	94	1
04/30	0.5				6.5	3.9	2.1	10.6	96	11		70	320	3
05/14	0.7	50	13.0	11.3	6.8	5.7	3.7	11.0	106	14	0.40	90	643	7
05/29	1.2				6.7	5.7	3.7	9.4	93	15		72	1,550	34
06/11	0.8				6.7	5.7	3.8	9.1	94	17		118	1,200	21
06/25	0.7				6.8	6.2	4.1	8.7	95	20		72	400	17
07/09	0.9				6.8	6.8	5.0	8.4	92	20		75	567	18
07/23	0.7				6.9	7.6	5.9	8.4	92	20		82	1,867	25
08/06	1.0	55	13.0	11.4	6.9	8.2	6.5	7.7	89	23	0.73	72	2,600	74
08/20	0.5				7.0	9.1	7.3	8.3	90	20		83	3,500	57
09/04	0.3				7.0	9.3	7.5	8.1	81	16		88	1,133	15
09/17	0.4				7.0	9.6	7.8	10.0	94	13		88	600	13
10/01	0.5				6.9	9.0	7.3	9.6	87	11		78	267	4
10/15	0.3				6.8	8.9	7.2	9.3	90	14		80	1,533	13
10/29	0.5				6.9	8.9	7.1	12.0	94	5		78	543	22
11/13	0.6	30	11.8	12.0	6.9	8.3	6.6	14.7	103	1	0.30	43	550	1
11/26	0.5				6.9	7.6	5.5	10.7	93	9		75	660	4
12/10	0.7				6.9	6.8	4.6	14.7	103	1		78	290	6
12/26	0.6				6.6	5.6	3.8	13.4	94	1		90	260	3
AVG.	0.6	46	13.3	11.8	6.7	6.8	4.9	11.4	95	9	0.45	80	808	16
MAX.	1.2	55	15.2	12.5	7.0	9.6	7.8	15.4	106	23	0.73	118	TNTC	74
MIN.	0.3	30	11.8	11.3	6.1	3.2	1.2	7.7	81	0	0.30	43	94	1
MEDIAN	0.6	49	13.0	11.7	6.8	6.7	4.6	10.9	94	10	0.38	79	547	13

1/22 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 4,907%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

BOAT COVE BROOK -- NEAR MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	2.0				7.0	18.4	16.4	12.8	90	1		73	300	5
01/22	0.5				7.1	20.0	17.9	14.2	100	1		78	58	2
02/05	0.8	15	2.8	27.2	7.1	19.5	17.5	13.2	93	1	0.15	73	60	2
02/20	0.8				7.1	17.0	14.9	14.6	100	0		70	68	2
03/05	0.6				7.1	17.4	15.5	12.8	90	1		67	60	0
03/19	2.5				7.1	14.1	12.0	14.5	102	1		53	86	17
03/23														14
03/29														0
03/29														2
03/29														2
03/29														5
04/02	1.6				7.0	9.9	8.1	12.1	87	2		45	52	5
04/17	0.7				7.2	14.1	12.0	11.8	100	8		53	140	5
04/30	0.5				7.3	18.1	16.4	10.2	88	9		65	140	14
05/14	0.7	22	2.3	26.8	7.4	23.3	21.3	10.0	92	12	0.17	75	620	5
05/29	0.6				7.4	23.9	21.8	9.1	88	14		73	1,014	7
06/11	0.9				7.4	26.9	24.8	9.2	93	16		80	667	0
06/25	0.7				7.4	26.0	24.0	8.4	90	19		75	1,167	33
07/09	0.8				7.4	26.7	24.6	8.4	90	19		82	567	55
07/23	0.8				7.4	31.2	29.2	7.9	83	18		92	1,150	3
08/06	0.5	28	2.5	33.6	7.3	25.6	23.6	6.9	77	21	0.10	92	4,200	120
10/15	0.9				7.3	29.5	27.4	9.4	91	14		120	10,000	TNTC
10/29	0.3				7.4	31.7	29.8	11.5	92	6		120	457	13
11/26	0.9				7.5	33.1	31.2	10.0	88	10		128	500	4
12/10	0.9				7.5	35.5	33.5	11.9	86	2		137	420	96
12/26	1.3				7.2	18.7	16.8	12.3	86	1		108	460	22
AVG.	0.9	22	2.5	29.2	7.3	22.9	20.9	11.0	91	8	0.14	84	1,056	28
MAX.	2.5	28	2.8	33.6	7.5	35.5	33.5	14.6	102	21	0.17	137	10,000	TNTC
MIN.	0.3	15	2.3	26.8	7.0	9.9	8.1	6.9	77	0	0.10	45	52	0
MEDIAN	0.8	22	2.5	27.2	7.3	23.3	21.3	11.5	90	8	0.15	75	457	5

10/15 TOTAL COLIFORM RESULT (WITH THE AVERAGE YEARLY DECREASE OF 97%)WAS USED FOR FECAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

GATES BROOK @ MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.3				5.7	2.5	0.7	13.4	94	1		28	180	0
01/22	0.2				6.0	2.9	1.0	14.8	104	1		28	152	0
02/05	0.3	7	1.8	5.7	5.9	2.7	0.8	13.8	97	1	0.05	28	114	0
02/20	0.2				5.9	2.5	0.7	13.7	96	1		28	72	0
03/05	0.4				5.7	2.2	0.2	13.4	92	0		28	35	0
04/02	0.4				5.1	1.6	-0.3	12.7	92	2		25	80	0
04/17	0.2				5.3	2.0	0.1	12.2	98	6		25	140	0
04/30	0.2				5.6	1.8	-0.2	11.6	93	6		27	214	0
05/14	0.2	8	1.5	5.5	6.1	2.4	0.5	11.0	95	9	0.04	28	620	0
05/29	0.3				5.7	2.1	0.2	10.4	92	10		23	1,671	1
06/11	0.3				6.0	2.2	0.4	10.4	98	13		27	467	0
06/25	0.3				5.7	2.4	0.3	9.7	96	15		25	1,300	12
07/09	0.4				6.0	2.6	0.8	9.6	95	15		28	1,900	19
07/23	0.3				6.0	2.9	1.2	8.8	91	17		28	867	8
08/06	0.3	17	1.8	5.9	6.0	2.8	0.9	9.0	94	18	0.07	30	1,600	20
08/20	0.3				6.1	3.3	1.6	8.4	88	18		28	1,333	14
09/04	0.2				6.3	3.4	1.5	9.6	95	15		30	1,267	66
09/17	0.2				6.3	4.0	2.3	9.8	90	12		30	533	20
10/01	0.2				6.4	3.3	1.7	10.6	96	11		32	1,200	15
10/15	0.6				6.2	4.1	2.6	9.4	89	13		32	TNTC	TNTC
10/29	0.3				6.3	4.5	2.7	11.4	89	5		32	543	2
11/13	0.2	10	1.6	5.8	6.5	4.4	2.4	14.7	103	1	0.04	32	100	1
11/26	0.2				6.5	4.6	2.7	10.4	90	9		32	240	2
12/10	0.3				6.5	5.2	3.5	14.9	105	1		32	140	9
12/26	0.3				6.2	3.1	1.2	13.0	91	1		32	146	1
AVG.	0.3	11	1.7	5.7	6.0	3.0	1.2	11.5	95	8	0.05	29	621	8
MAX.	0.6	17	1.8	5.9	6.5	5.2	3.5	14.9	105	18	0.07	32	TNTC	TNTC
MIN.	0.2	7	1.5	5.5	5.1	1.6	-0.3	8.4	88	0	0.04	23	35	0
MEDIAN	0.3	9	1.7	5.8	6.0	2.8	0.9	11.0	94	9	0.05	28	354	1

10/15 THE TNTC FOR TOTAL AND FECAL COLIFORM WAS EXCLUDED WHEN CALCULATING AVG. AND MED.

QUABBIN LABORATORY RECORDS 2001

(211B-X) CADWELL CREEK @ MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.3				6.0	2.4	0.7	13.4	92	0		40	250	0
01/22	0.2				6.2	3.2	1.2	14.9	102	0		42	220	0
02/05	0.2	7	7.4	7.6	6.2	2.9	1.0	13.9	95	0	0.04	43	206	2
02/20	0.2				6.0	2.6	0.5	14.2	100	1		50	92	0
03/05	0.3				6.1	3.0	1.1	13.4	92	0		45	88	0
03/19	0.3				5.8	2.3	0.2	14.5	105	2		48	74	0
04/02	0.4				5.5	2.1	0.4	12.7	92	2		40	42	1
04/17	0.2				5.5	2.0	0.0	12.3	96	5		40	188	0
04/30	0.2				6.1	2.8	1.2	11.6	93	6		35	230	18
05/14	0.2	13	3.5	6.5	6.4	4.0	2.2	11.2	97	9	0.05	35	620	1
05/29	0.3				6.2	3.3	1.3	10.4	94	11		43	2,500	3
06/11	0.3				6.3	4.0	2.2	10.3	97	13		43	833	10
06/25	0.3				6.2	2.9	1.1	9.6	95	15		32	1,250	15
07/09	0.5				6.4	3.9	2.2	9.4	95	16		33	3,100	174
07/23	0.2				6.6	5.3	3.3	8.8	89	16		33	1,200	9
08/06	0.3	17	5.3	8.0	6.4	4.2	2.5	8.6	90	18	0.06	43	3,400	60
08/20	0.2				6.7	6.2	4.3	8.4	88	18		37	1,533	74
09/04	0.2				6.7	6.8	5.1	9.3	90	14		37	1,467	12
09/17	0.2				6.7	6.9	5.1	10.2	90	10		35	733	7
10/01	0.2				6.6	6.5	4.9	10.7	94	10		42	533	4
10/15	0.3				6.6	7.0	5.4	9.5	88	12		38	3,600	190
10/29	0.2				6.7	6.4	4.5	11.7	90	4		38	686	24
11/13	0.2	10	3.2	8.2	6.7	5.7	3.7	14.0	98	1	0.03	40	160	0
11/26	0.2				6.6	4.9	2.8	10.8	93	9		42	620	1
12/10	0.3				6.6	6.1	4.3	14.7	103	1		42	280	0
12/26	0.2				6.3	3.3	1.6	13.4	92	0		47	260	3
AVG.	0.3	12	4.9	7.6	6.3	4.3	2.4	11.6	94	7	0.05	40	929	23
MAX.	0.5	17	7.4	8.2	6.7	7.0	5.4	14.9	105	18	0.06	50	3,600	190
MIN.	0.2	7	3.2	6.5	5.5	2.0	0.0	8.4	88	0	0.03	32	42	0
MEDIAN	0.2	12	4.4	7.8	6.4	4.0	2.2	11.4	94	8	0.05	40	577	3

QUABBIN LABORATORY RECORDS 2001

(211A) ATHERTON BROOK @ RT. 202

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.3				6.2	3.8	2.1	13.3	91	0		35	230	0
01/22	0.2				6.3	3.9	2.0	15.3	105	0		37	120	0
02/05	0.3	15	5.5	6.5	6.3	3.7	1.8	13.6	93	0	0.07	35	138	1
02/20	0.2				6.3	3.6	1.8	14.7	103	1		38	88	1
03/05	0.3				6.3	3.3	1.2	13.2	90	0		38	74	14
03/19	0.2				6.2	3.5	1.6	14.1	102	2		48	58	9
04/02	0.5				5.8	2.3	0.5	12.5	90	2		48	56	8
04/17	0.2				5.5	2.2	0.2	12.8	98	4		30	128	0
04/30	0.2				5.9	2.2	0.4	11.8	95	6		32	190	0
05/14	0.2	18	3.6	5.6	6.4	3.6	1.7	10.8	93	9	0.07	32	635	4
05/29	0.2				6.1	2.8	0.9	10.2	92	11		38	1,000	8
06/11	0.2				6.4	3.3	1.3	10.6	98	12		32	1,300	2
06/25	0.3				6.0	3.1	1.0	9.5	94	15		38	2,600	31
07/09	0.3				6.2	4.0	2.2	9.5	94	15		38	1,800	16
07/23	0.3				6.5	4.9	3.2	8.5	86	16		32	800	13
08/06	0.3	38	3.7	5.0	5.9	3.3	1.4	8.9	92	17	0.18	32	2,100	43
08/20	0.2				6.6	5.7	3.9	8.1	83	17		32	1,267	20
09/04	0.3				6.8	6.8	5.1	9.3	90	14		32	1,400	15
09/17	0.2				6.8	6.5	4.4	10.0	88	10		32	933	7
10/01	0.2				6.5	5.1	3.4	10.8	95	10		33	333	2
10/15	0.4				6.4	5.6	3.6	9.4	87	12		35	2,200	86
10/29	0.2				6.6	5.0	3.1	11.8	90	4		37	229	1
11/13	0.2	15	5.2	6.8	6.6	5.5	3.7	14.7	103	1	0.05	40	250	24
11/26	0.2				6.5	5.1	3.5	10.5	89	8		47	370	9
12/10	0.3				6.6	4.7	2.7	15.1	103	0		43	118	1
12/26	0.2				6.2	3.4	1.5	13.0	89	0		47	86	5
AVG.	0.3	22	4.5	6.0	6.3	4.1	2.2	11.6	94	7	0.09	37	712	12
MAX.	0.5	38	5.5	6.8	6.8	6.8	5.1	15.3	105	17	0.18	48	2,600	86
MIN.	0.2	15	3.6	5.0	5.5	2.2	0.2	8.1	83	0	0.05	30	56	0
MEDIAN	0.2	17	4.5	6.1	6.3	3.8	1.9	11.3	93	7	0.07	36	292	8

QUABBIN LABORATORY RECORDS 2001

(212) HOP BROOK -- GATE #22

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.5				6.7	7.6	5.7	13.3	91	0		82	240	0
01/22	0.5				6.7	8.6	6.7	15.2	104	0		98	122	1
02/05	0.5	13	19.5	15.6	6.7	8.1	6.2	13.8	94	0	0.22	100	168	1
02/20	0.5				6.7	8.1	6.3	14.7	101	0		113	114	1
03/05	0.6				6.8	7.7	5.7	13.2	90	0		118	80	2
03/19	0.4				6.8	7.4	5.4	14.1	102	2		185	90	3
04/02	0.4				6.6	6.0	4.2	12.5	90	2		147	46	3
04/17	0.4				6.5	4.4	2.5	12.5	98	5		72	110	1
04/30	0.5				6.7	6.6	4.9	11.2	92	7		95	200	9
05/14	1.0	28	20.2	15.7	6.8	9.6	7.5	10.3	93	11	0.43	110	520	23
05/29	0.9				6.8	8.8	6.7	9.8	90	12		98	1,200	53
06/11	1.2				6.8	9.9	7.7	9.5	94	15		112	733	43
06/25	1.2				6.8	8.7	6.7	9.0	93	17		87	2,000	108
07/09	1.6				6.8	10.5	8.8	9.1	94	17		102	1,200	33
07/23	2.7				6.7	13.2	11.4	7.6	81	19		120	833	22
08/06	2.2	55	23.5	19.5	6.7	13.1	11.3	7.6	84	21	1.10	123	2,000	66
08/20	2.5				6.7	16.1	14.3	6.8	74	20		122	1,400	45
09/04	3.2				6.7	18.4	16.5	6.7	67	16		108	1,733	13
09/17	2.2				6.6	12.1	10.2	8.4	78	12		140	733	17
10/01	2.3				6.6	11.4	9.5	9.2	83	11		143	1,000	32
10/15	1.5				6.7	12.5	10.9	9.1	86	13		128	4,000	128
10/29	1.7				6.7	12.4	10.5	10.2	80	5		138	457	3
11/13	0.8	17	24.2	20.5	6.7	10.7	8.6	13.0	97	3	0.37	128	230	1
11/26	0.9				6.8	10.3	8.3	10.4	88	8		130	350	2
12/10	0.7				6.7	10.1	8.1	14.4	101	1		123	210	2
12/26	0.6				6.7	8.0	6.0	13.0	89	0		138	TNTC	1
AVG.	1.2	28	21.9	17.8	6.7	10.0	8.1	10.9	90	8	0.53	118	762	24
MAX.	3.2	55	24.2	20.5	6.8	18.4	16.5	15.2	104	21	1.10	185	TNTC	128
MIN.	0.4	13	19.5	15.6	6.5	4.4	2.5	6.7	67	0	0.22	72	46	0
MEDIAN	0.9	23	21.9	17.6	6.7	9.8	7.6	10.4	91	8	0.40	119	404	6

12/26 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 3,230%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

(212-X) HOP BROOK @ MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.4				6.9	7.3	5.3	13.8	94	0		75	220	0
01/22	0.5				6.9	8.3	6.4	15.9	109	0		88	118	1
02/05	0.5	13	17.0	14.9	6.9	8.1	6.2	14.1	96	0	0.18	90	200	21
04/30	0.5				6.9	6.8	5.1	11.6	96	7		88	240	11
05/14	0.7	25	17.3	14.6	7.1	9.2	7.2	11.0	99	11	0.32	100	680	15
05/29	0.7				7.1	8.6	6.4	10.2	94	12		88	2,600	59
06/11	0.7				7.1	9.4	7.3	10.2	98	14		100	667	30
06/25	1.0				7.1	8.8	6.9	9.4	97	17		82	2,067	108
07/09	1.4				7.1	10.4	8.8	9.6	99	17		92	1,100	49
07/23	1.0				7.1	11.7	9.9	8.8	91	17		105	633	9
08/06	0.9	37	19.2	18.2	7.1	12.5	10.5	8.9	95	19	0.52	108	1,600	48
08/20	0.7				7.2	14.7	12.9	8.4	90	19		100	2,100	13
09/04	0.4				7.2	15.1	13.4	9.5	92	14		83	933	17
09/17	0.5				7.1	12.4	10.7	10.4	92	10		113	133	3
10/01	0.6				7.1	10.9	9.0	10.9	99	11		120	133	2
10/15	0.7				7.0	11.6	9.8	9.9	93	13		93	2,867	58
10/29	0.5				7.1	11.3	9.6	12.2	94	4		118	114	2
11/13	0.4	13	20.4	19.4	7.1	10.7	8.7	15.1	106	1	0.17	112	54	1
11/26	0.5				7.1	10.1	8.0	11.2	95	8		115	260	5
12/10	0.7				7.0	9.9	8.0	15.7	107	0		112	90	1
12/26	0.4				6.9	7.6	5.6	13.6	93	0		122	TNTC	1
AVG.	0.7	22	18.5	16.8	7.1	10.3	8.4	11.4	97	9	0.30	100	802	22
MAX.	1.4	37	20.4	19.4	7.2	15.1	13.4	15.9	109	19	0.52	122	TNTC	108
MIN.	0.4	13	17.0	14.6	6.9	6.8	5.1	8.4	90	0	0.17	75	54	0
MEDIAN	0.6	19	18.3	16.6	7.1	10.1	8.0	10.9	95	11	0.25	100	260	11

12/26 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 3,711%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

(215A) WEST BR. OF FEVER BROOK -- WOMENS FED.

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.9				6.0	5.5	3.4	12.0	84	1		90	320	4
02/05	0.8	45	19.8	13.5	6.1	5.3	3.1	12.7	89	1	0.43	93	300	2
04/30	0.7				6.1	4.5	2.5	9.0	85	13		73	TNTC	2
05/14	1.2	85	13.8	10.0	6.3	6.6	4.5	10.1	102	16	0.88	80	460	1
05/29	1.3				6.3	6.1	4.1	8.0	82	17		82	1,000	23
06/11	0.9				6.2	4.9	2.7	6.9	74	19		90	233	2
06/25	1.3				6.2	7.4	5.2	6.4	71	21		92	400	1
07/09	1.0				6.2	7.9	6.2	6.3	69	20		92	467	7
07/23	1.0				6.3	9.3	7.4	5.1	57	21		100	533	9
08/06	1.0	80	19.2	12.5	6.2	7.4	5.3	5.4	62	23	0.93	92	2,000	TNTC
10/01	1.5				6.3	7.8	5.8	8.0	76	13		88	533	14
10/15	1.0				6.2	7.0	5.2	8.0	77	14		92	2,500	46
10/29	1.3				6.3	8.1	6.4	8.7	72	7		100	514	0
11/13	1.2	60	21.0	12.6	6.4	6.9	4.8	11.4	85	3	0.65	105	250	1
11/26	1.2				6.3	6.5	4.4	9.1	79	9		110	473	0
12/10	1.5				6.3	6.9	4.9	11.9	89	3		110	270	0
12/26	0.9				6.2	5.2	3.4	11.4	85	3		110	400	1
AVG.	1.1	68	18.5	12.2	6.2	6.7	4.7	8.8	79	12	0.72	94	638	9
MAX.	1.5	85	21.0	13.5	6.4	9.3	7.4	12.7	102	23	0.93	110	TNTC	TNTC
MIN.	0.7	45	13.8	10.0	6.0	4.5	2.5	5.1	57	1	0.43	73	233	0
MEDIAN	1.0	70	19.5	12.6	6.2	6.9	4.8	8.7	79	13	0.77	92	460	2

4/30 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 9,427%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

8/6 TOTAL COLIFORM RESULT (WITH THE AVERAGE YEARLY DECREASE OF 98%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

(215) EAST BR. OF FEVER BROOK -- ON WEST RD.

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.5				5.7	4.6	2.9	10.5	74	1		100	160	0
01/22	0.5				5.8	5.0	2.9	11.4	78	0		100	170	1
02/05	0.5	65	22.3	13.4	5.8	4.6	2.6	10.7	75	1	0.42	100	146	0
02/20	0.4				5.7	4.7	2.5	11.7	80	0		98	108	3
03/05	0.6				5.8	4.7	2.8	10.4	73	1		95	92	1
03/19	0.4				5.7	3.5	1.3	12.7	89	1		100	100	8
04/02	0.4				5.5	2.7	0.7	11.2	79	1		100	96	6
04/17	0.3				5.5	2.6	0.6	10.4	81	5		60	160	2
04/30	0.5				5.6	2.6	0.9	8.2	79	14		100	TNTC	8
05/14	0.6	80	19.2	10.2	6.0	4.1	2.2	11.0	113	17	0.70	110	1,500	17
05/29	1.0				5.8	4.2	2.2	7.1	73	17		125	933	17
06/11	0.5				5.7	3.5	1.7	7.1	77	20		88	733	0
06/25	0.6				5.7	3.6	1.6	5.4	61	22		90	533	6
07/09	0.6				5.8	4.3	2.4	6.7	73	20		98	700	22
07/23	0.7				5.8	4.5	2.7	5.9	64	20		108	667	10
08/06	0.6	70	23.6	11.3	5.9	4.2	2.3	5.5	62	22	0.68	103	1,600	58
08/20	0.9				6.1	5.9	3.9	6.0	65	20		117	TNTC	27
09/17	0.8				6.1	5.9	3.9	7.6	70	12		117	867	26
10/01	0.7				6.1	6.7	4.9	8.1	75	12		120	600	12
10/15	0.6				6.0	7.0	5.3	5.2	49	13		128	7,000	TNTC
10/29	0.7				6.0	6.5	4.8	7.7	60	5		133	343	0
11/13	0.7	42	25.6	13.2	6.0	5.2	3.5	11.5	86	3	0.40	145	330	2
11/26	0.8				6.0	5.4	3.7	7.7	67	9		140	800	1
12/10	0.9				6.1	4.9	3.2	11.6	84	2		145	720	18
12/26	0.7				5.8	4.5	2.8	10.1	75	3		132	680	9
AVG.	0.6	64	22.7	12.0	5.8	4.6	2.7	8.9	74	10	0.55	110	866	13
MAX.	1.0	80	25.6	13.4	6.1	7.0	5.3	12.7	113	22	0.70	145	TNTC	TNTC
MIN.	0.3	42	19.2	10.2	5.5	2.6	0.6	5.2	49	0	0.40	60	92	0
MEDIAN	0.6	68	23.0	12.3	5.8	4.6	2.7	8.2	75	9	0.55	103	600	8

4/30 AND 8/20 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 7,495%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.
10/15 TOTAL COLIFORM RESULT (WITH THE AVERAGE YEARLY DECREASE OF 99%) WAS USED FOR FECAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

(216B) RAND BROOK -- RT. 32A

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/08	0.8				6.8	9.7	7.9	13.5	95	1		62	340	7
01/22	1.0				6.9	10.3	8.3	15.6	107	0		63	TNTC	4
02/05	1.2	43	8.3	15.4	6.9	9.8	7.6	14.1	99	1	0.62	63	310	2
02/20	0.7				6.9	8.8	6.8	15.5	106	0		67	146	2
03/05	0.9				6.9	8.9	7.0	13.4	94	1		70	170	66
03/08														8
03/19	0.8				6.8	8.1	5.9	14.4	101	1		78	134	4
04/02	0.6				6.6	5.4	3.6	12.7	92	2		58	124	4
04/17	0.5				6.6	4.4	2.3	12.1	97	6		50	150	2
04/30	0.6				6.8	6.8	5.2	11.0	95	9		63	420	30
05/14	1.3	45	6.5	13.3	6.9	8.7	6.7	10.4	98	13	0.50	70	500	21
05/29	1.2				6.9	8.5	6.6	9.7	94	14		65	2,100	108
06/11	1.2				6.9	9.9	8.1	9.5	98	17		67	800	19
06/25	1.4				7.0	10.8	8.7	8.5	93	20		62	1,000	18
07/09	1.5				6.9	11.5	9.9	8.9	95	19		70	300	11
07/23	1.7				7.0	12.6	10.5	8.0	89	21		72	567	24
08/06	1.5	70	8.4	14.5	7.0	12.1	10.0	7.9	91	23	0.85	65	2,000	47
08/20	1.5				7.1	13.6	11.8	7.9	89	22		78	1,200	18
09/04	2.0				7.1	14.1	12.0	8.9	92	17		80	2,133	8
09/17	1.7				7.0	13.2	11.4	9.7	92	13		82	400	12
10/01	2.0				7.0	12.8	11.0	10.4	96	12		77	1,000	6
10/15	1.5				6.9	13.5	11.4	9.4	91	14		77	2,000	15
10/29	0.8				6.9	12.3	10.5	11.6	93	6		80	400	1
11/13	0.6	28	10.5	16.0	7.0	11.9	10.0	13.8	103	3	0.25	82	380	3
11/26	0.7				7.0	11.9	9.7	10.7	93	9		77	560	2
12/10	0.7				7.0	11.9	9.7	14.3	103	2		80	500	0
12/26	0.7				6.9	10.5	8.7	13.2	93	1		80	440	2
AVG.	1.1	47	8.4	14.8	6.9	10.5	8.5	11.4	96	10	0.56	71	702	16
MAX.	2.0	70	10.5	16.0	7.1	14.1	12.0	15.6	107	23	0.85	82	TNTC	108
MIN.	0.5	28	6.5	13.3	6.6	4.4	2.3	7.9	89	0	0.25	50	124	0
MEDIAN	1.1	44	8.4	15.0	6.9	10.7	8.7	10.9	95	9	0.56	70	430	8

1/22 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 4,184%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

WARE RIVER @ SHAFT #8

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI	ELEV
01/02	0.7				6.2	5.6	3.7	14.0	96	0		80	157	1	
01/16	0.8				6.2	5.5	3.7	13.9	95	0		73	116	6	
01/29	0.8				6.3	5.9	4.0	14.0	96	0		78	86	0	
02/12	0.9	45	16.5	11.7	6.2	5.6	3.7	14.0	96	0	0.42	87	68	0	
02/26	0.9				6.2	5.5	3.6	13.8	94	0		100	86	1	
03/12	0.7				6.3	5.8	4.0	14.0	98	1		100	80	1	
03/26	0.7				5.8	3.3	1.6	13.6	93	0		75	53	3	5.86
04/09	0.6				5.8	2.7	0.8	12.7	92	2		68	120	0	5.50
04/23	0.6				6.0	3.4	1.6	9.8	93	13		63	290	13	
05/07	1.5	85	14.7	10.5	6.3	5.7	3.9	9.3	92	15	0.88	73	320	26	4.19
05/21	1.8				6.5	5.3	3.4	9.9	104	18		88	343	13	3.66
06/04	1.5				6.2	4.1	2.0	9.2	91	15		62	1,300	104	4.84
06/18	1.8				5.8	3.5	1.4	8.1	87	19		50	4,000	860	5.48
07/02	2.3				6.3	5.4	3.2	8.6	94	20		73	900	300	4.56
07/16	2.7				6.4	6.1	4.3	8.7	95	20		130	533	38	3.81
07/30	2.8				6.6	7.4	5.6	8.8	98	21		100	367	62	3.27
08/13	4.0	100	17.0	12.5	6.5	8.3	6.4	7.8	88	22	1.80	92	1,667	210	3.24
08/27	3.3				6.6	9.3	7.5	7.8	87	21		100	467	27	3.21
09/10	3.0				6.6	8.1	6.0	8.1	88	20		100	200	33	2.99
09/24	2.5				6.5	7.0	5.0	8.5	91	19		90	533	30	3.18
10/09	2.0				6.6	6.8	4.9	10.2	90	10		115	213	42	3.00
10/22	2.0				6.6	7.1	5.6	10.0	90	11		102	67	2	3.06
11/05	2.3	70	15.3	12.8	6.6	6.8	4.7	10.8	91	8	1.20	93	160	2	3.22
11/19	1.8				6.6	6.9	5.2	11.8	92	5		90	203	1	3.10
12/03	2.2				6.6	7.1	5.5	10.9	90	7		85	257	4	3.20
12/17	1.6				6.5	6.3	4.6	12.3	92	3		85	350	6	3.38
AVG.	1.8	75	15.9	11.9	6.3	5.9	4.1	10.8	93	10	1.08	87	498	69	
MAX.	4.0	100	17.0	12.8	6.6	9.3	7.5	14.0	104	22	1.80	130	4,000	860	
MIN.	0.6	45	14.7	10.5	5.8	2.7	0.8	7.8	87	0	0.42	50	53	0	
MEDIAN	1.8	78	15.9	12.1	6.4	5.9	4.0	10.1	92	11	1.04	88	235	10	

WARE RIVER @ SHAFT #11A

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI	ELEV
04/17	0.6				5.8	2.9	1.1	11.6	91	5		63	154	1	

QUABBIN LABORATORY RECORDS 2001
WARE RIVER AND TRIBUTARIES
(111) QUEEN LAKE @ ROAD CULVERT

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.4				6.6	5.5	3.3	14.9	105	1		58	129	2
01/16	0.4				6.6	6.1	4.3	15.0	105	1		58	140	0
01/29	0.4				6.6	5.9	4.0	15.1	106	1		60	162	0
02/12	0.4	10	9.2	12.0	6.6	5.7	3.8	14.7	103	1	0.08	62	142	0
02/26	0.6				6.6	5.8	3.9	14.0	104	3		62	230	13
03/12	0.4				6.6	6.0	4.2	16.0	112	1		60	122	7
03/26	0.4				6.5	5.2	3.2			2		58	147	130
04/09	0.4				6.4	4.5	2.6	14.1	102	2		50	33	22
04/23	0.4				6.5	5.0	3.0	11.7	99	8		52	113	8
05/07	0.9	13	8.0	11.0	6.6	6.7	4.8	10.4	92	10	0.28	58	547	20
05/21	0.8				6.7	7.9	6.1	9.7	92	13		62	1,000	195
06/04	0.6				6.3	5.4	3.6	10.4	96	12		52	800	56
06/18	0.6				6.5	6.8	4.8	9.0	93	17		52	1,600	68
07/02	0.8				6.6	6.4	4.6	8.5	88	17		58	1,600	68
07/16	0.8				6.6	6.4	4.5	8.8	92	18		60	667	38
07/30	0.8				6.7	6.6	5.0	8.2	88	19		60	667	42
08/13	1.3	15	8.3	10.4	6.7	6.4	4.8	8.2	89	20	0.37	58	2,100	88
08/27	0.7				6.7	6.6	4.8	8.1	88	20		58	1,067	35
09/24	0.7				6.6	7.1	5.3	8.8	91	17		60	533	46
10/09	0.5				6.5	5.0	3.3	10.7	97	11		58	3,800	91
10/22	0.6				6.4	5.9	4.1	9.9	89	11		60	400	30
11/05	0.6	13	8.5	10.2	6.6	4.7	2.9	11.4	99	9	0.12	58	790	19
11/19	0.5				6.6	5.4	3.5	12.2	98	6		58	487	2
12/03	0.8				6.6	6.3	4.8	12.1	97	6		60	520	10
12/17	0.8				6.6	5.8	4.1	13.5	100	3		58	400	20
AVG.	0.6	13	8.5	10.9	6.6	6.0	4.1	11.5	97	9	0.21	58	728	40
MAX.	1.3	15	9.2	12.0	6.7	7.9	6.1	16.0	112	20	0.37	62	3,800	195
MIN.	0.4	10	8.0	10.2	6.3	4.5	2.6	8.1	88	1	0.08	50	33	0
MEDIAN	0.6	13	8.4	10.7	6.6	5.9	4.1	11.1	97	9	0.20	58	520	22

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

(112) BURNSHIRT RIVER @ WILLIAMSVILLE RD.

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.4				5.9	3.3	1.4	15.0	103	0		58	100	0
01/16	0.6				6.0	3.9	1.7	15.2	107	1		58	174	0
01/29	0.5				6.1	4.2	2.2	15.2	104	0		58	152	3
02/12	0.5	48	12.0	9.8	6.0	3.6	1.7	14.8	101	0	0.33	68	106	4
02/26	0.5				6.0	3.8	1.7	15.1	106	1		72	92	7
03/12	0.5				6.1	4.3	2.4	16.2	111	0		73	64	0
03/26	0.5				5.6	2.1	0.3			1		72	73	2
04/09	0.4				5.6	2.3	0.5	14.7	103	1		62	20	1
04/23	0.4				5.7	2.3	0.4	10.7	97	11		48	180	0
05/07	0.6	55	9.2	7.4	6.0	2.9	1.1	9.7	94	14	0.32	52	400	7
05/21	0.7				6.1	3.2	1.3	9.4	95	16		53	600	12
06/04	0.7				6.2	3.9	1.8	8.9	90	16		50	400	8
06/18	0.6				6.0	3.6	1.6	8.2	91	21		52	267	35
07/02	0.7				6.1	4.4	2.5	7.6	83	20		57	500	40
07/16	0.9				6.0	4.2	2.4	7.2	78	20		57	333	15
07/30	1.5				6.0	5.2	3.1	6.7	73	20		58	1,000	8
08/13	1.3	90	10.2	7.8	5.9	5.7	3.8	6.1	68	21	1.20	57	800	40
08/27	1.2				6.0	5.2	3.1	6.2	69	21		57	2,400	20
09/10	1.2				6.2	5.4	3.6	6.6	73	21		58	1,200	27
09/24	1.0				6.1	5.2	3.4	7.1	73	17		58	733	50
10/09	0.7				6.1	4.2	2.4	9.2	78	8		58	1,450	28
10/22	0.8				6.1	4.3	2.8	8.6	78	11		57	400	10
11/05	1.2	60	10.8	8.2	6.2	5.3	3.7	9.6	81	8	0.65	57	670	7
11/19	1.2				6.2	4.4	2.3	11.5	88	4		57	1,060	4
12/03	0.9				6.2	5.0	3.0	10.3	80	5		55	710	17
12/17	0.6				6.2	4.3	2.7	13.3	96	2		58	520	5
AVG.	0.8	63	10.6	8.3	6.0	4.1	2.2	10.5	89	10	0.63	58	554	13
MAX.	1.5	90	12.0	9.8	6.2	5.7	3.8	16.2	111	21	1.20	73	2,400	50
MIN.	0.4	48	9.2	7.4	5.6	2.1	0.3	6.1	68	0	0.32	48	20	0
MEDIAN	0.7	58	10.5	8.0	6.1	4.2	2.4	9.6	90	10	0.49	58	400	8

QUABBIN LABORATORY RECORDS 2001
WARE RIVER AND TRIBUTARIES
(103) BURNSHIRT RIVER @ RT. 62

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.5				5.8	3.8	1.7	13.9	95	0		55	271	1
01/16	0.5				5.9	3.6	1.7	14.6	103	1		55	320	0
01/29	0.6				6.0	4.4	2.5	14.7	101	0		55	170	0
02/12	0.6	45	12.8	9.5	5.9	3.8	1.9	14.7	101	0	0.37	70	165	2
02/26	1.2				5.9	3.6	1.7	15.7	107	0		123	104	1
03/12	0.6				6.0	4.0	2.0	16.5	113	0		80	200	2
03/26	0.5				5.7	2.4	0.3			0		68	73	4
04/09	0.5				5.6	2.0	0.1	14.1	102	2		60	53	1
04/23	0.5				5.7	2.6	0.6	10.3	95	12		50	360	3
05/07	0.9	60	9.4	7.5	6.0	3.8	1.9	9.4	89	13	0.62	52	729	6
05/21	1.2				6.1	4.2	2.2	8.4	85	16		52	1,100	27
06/04	1.0				5.9	3.0	1.0	9.5	94	15		50	500	42
06/18	1.2				5.7	3.1	1.0	8.4	90	19		45	1,767	350
07/02	1.3				6.1	3.9	1.7	7.6	81	19		50	400	50
07/16	1.0				6.0	4.1	2.1	7.5	79	18		50	267	3
07/30	1.4				6.1	4.9	3.0	3.0	32	18		50	567	34
08/13	1.6	90	8.8	7.5	6.2	5.5	3.4	7.1	77	20	1.60	50	400	26
08/27	1.4				6.2	5.5	3.7	7.2	78	20		50	1,533	290
09/10	1.2				6.2	5.7	4.0	7.4	81	20		52	400	60
09/24	0.8				6.1	5.1	3.4	8.0	80	16		53	400	5
10/09	0.7				6.1	5.0	3.4	10.4	86	7		52	660	4
10/22	0.8				6.1	5.1	3.5	9.9	87	10		52	267	35
11/05	0.7	50	9.8	7.6	6.2	4.8	2.8	11.3	93	7	0.80	52	313	4
11/19	0.7				6.2	5.0	3.3	12.4	92	3		52	490	6
12/03	0.8				6.3	4.4	2.6	11.9	91	4		52	363	1
12/17	0.9				6.3	4.7	2.7	14.1	99	1		52	3,000	4
AVG.	0.9	61	10.2	8.0	6.0	4.2	2.2	10.7	89	9	0.85	57	572	37
MAX.	1.6	90	12.8	9.5	6.3	5.7	4.0	16.5	113	20	1.60	123	3,000	350
MIN.	0.5	45	8.8	7.5	5.6	2.0	0.1	3.0	32	0	0.37	45	53	0
MEDIAN	0.8	55	9.6	7.6	6.1	4.2	2.2	10.3	91	9	0.71	52	382	4

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

(115) BRIGHAM POND @ OUTLET

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.5				5.9	3.7	1.7	14.1	96	0		50	320	0
01/16	0.5				5.9	4.6	2.5	14.4	101	1		48	TNTC	0
01/29	0.5				6.0	4.7	2.7	14.1	99	1		50	200	0
02/12	0.6	65	8.8	8.6	6.0	4.1	2.0	13.8	94	0	0.40	52	158	0
02/26	0.6				6.0	4.8	2.8	14.8	104	1		60	250	1
03/12	0.6				6.0	4.2	2.1	15.5	109	1		60	96	1
03/26	0.6				5.6	3.0	1.2			0		50	110	5
04/09	0.5				5.7	3.0	1.0	14.2	100	1		50	56	3
04/23	0.4				5.7	2.7	0.8	10.5	95	11		38	300	4
05/07	0.6	60	8.0	7.0	6.2	3.4	1.4	9.2	91	15	0.33	43	393	1
05/21	0.7				6.3	4.0	2.0	9.0	95	18		45	71	4
06/04	0.8				5.9	4.3	2.4	8.8	87	15		42	333	27
06/18	1.7				5.8	4.1	2.1	7.0	76	20		40	4,400	980
07/02	0.9				6.1	4.6	2.7	6.7	76	22		45	800	33
07/16	1.2				6.3	4.9	3.2	7.4	85	23		47	67	7
07/30	0.8				6.4	5.5	3.7	7.0	82	24		47	333	5
08/13	0.9	95	7.4	7.4	6.3	5.4	3.5	6.2	73	24	1.00	47	100	1
08/27	1.8				6.2	6.6	4.8	5.2	60	23		48	250	9
09/10	1.5				6.4	6.7	4.8	6.6	75	22		48	LA	2
09/24	1.3				6.5	5.9	3.9	8.4	92	20		48	257	31
10/09	1.3				6.4	5.7	4.0	9.1	86	13		48	300	8
10/22	1.2				6.3	5.5	3.5	8.7	80	12		48	57	9
11/05	1.3	75	7.8	8.0	6.4	5.4	3.3	9.7	84	9	0.73	48	20	8
11/19	1.3				6.4	6.2	4.4	10.5	82	5		48	140	1
12/03	1.2				6.4	5.7	4.0	10.8	89	7		48	76	3
12/17	1.2				6.3	4.7	2.8	12.2	91	3		45	66	12
AVG.	0.9	74	8.0	7.8	6.1	4.7	2.8	10.2	88	11	0.62	48	381	44
MAX.	1.8	95	8.8	8.6	6.5	6.7	4.8	15.5	109	24	1.00	60	TNTC	980
MIN.	0.4	60	7.4	7.0	5.6	2.7	0.8	5.2	60	0	0.33	38	20	0
MEDIAN	0.9	70	7.9	7.7	6.2	4.7	2.8	9.2	89	12	0.57	48	179	4

1/16 THE TNTC FOR TOTAL COLIFORM WAS EXCLUDED WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001
WARE RIVER AND TRIBUTARIES
(116) ASNACOMET POND @ OUTLET

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI	Ecoli
01/02	0.4				6.4	4.6	2.8	13.1	95	2		37	27	0	
01/16	0.4				6.3	3.9	1.8	13.7	99	2		37	23	0	
01/29	0.3				6.3	3.9	2.0	12.5	88	1		38	27	0	
02/12	0.3	7	5.3	6.8	6.2	4.2	2.5	11.8	85	2	0.08	40	30	0	
02/26	0.3				6.3	4.3	2.2	12.6	91	2		40	21	0	
03/12	0.3				6.2	4.4	2.7	13.3	96	2		40	13	0	
03/26	0.3				6.1	3.8	1.7			2		37	5	0	
04/09	0.3				5.9	3.3	1.4	12.0	87	2		32	16	0	
04/23	0.4				6.2	4.1	2.1	10.6	89	8		38	25	0	
05/07	0.3	8	5.0	6.5	6.5	4.2	2.5	9.8	97	15	0.05	37	10	0	
05/21	0.4				6.5	4.1	2.4	9.7	98	16		38	106	0	
06/04	0.3				6.5	3.5	1.5	9.5	96	16		35	28	0	
06/18	0.4				6.5	3.7	1.9	8.0	92	23		35	260	18	
07/02	0.3				6.5	3.8	1.8	7.7	87	22		35	TNTC	6	
AVG.	0.3	8	5.2	6.7	6.3	4.0	2.1	11.1	92	8	0.07	37	56	2	
MAX.	0.4	8	5.3	6.8	6.5	4.6	2.8	13.7	99	23	0.08	40	TNTC	18	
MIN.	0.3	7	5.0	6.5	5.9	3.3	1.4	7.7	85	1	0.05	32	5	0	
MEDIAN	0.3	8	5.2	6.7	6.3	4.0	2.1	11.8	92	2	0.07	37	26	0	

7/2 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 3,283%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

(116A) ASNACOMET POND @ BEACH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI	Ecoli
06/18	1.3				6.4	3.4	1.6	8.1	95	24		35	TNTC	42	
06/23										23				2	
06/23										23				2	
06/23										23				2	
06/30										24				2	0
06/30										24				5	6
06/30										24				21	19
07/02	0.6				6.5	3.2	1.4	7.8	93	25		35		7	
07/07										23				1	0
07/07										23				10	5
07/07										23				9	3
07/14										23				3	0
07/14										23				850	653
07/14										23				1	0
07/16	0.5				6.5	3.7	2.0	7.9	94	25		35		13	
07/16														8	5
07/16														14	7
07/16														32	15
07/21										26				4	0
07/21										26				2	3
07/21										26				5	3
07/28										28				0	0
07/28										28				2	1
07/28										28				3	1
07/30	0.7				6.6	3.6	1.7	3.3	39	25		35		11	
08/04										25				5	3
08/04										25				5	1
08/04										25				3	6
08/11										27				9	4
08/11										27				18	12
08/11										27				5	4
08/13	0.3	7	5.0	6.4	6.6	4.1	2.4	7.4	88	25	0.04	37		21	
08/18										25				1	1
08/18										25				4	0
08/18										25				1	1
08/22										24				17	171
08/22										24				6	18
08/22										24				10	18
08/27	0.3				6.6	3.6	2.0	7.7	92	25		35		3	
08/30										21				3	0
08/30										21				2	3
08/30										21				1	3
AVG.	0.6	7	5.0	6.4	6.5	3.6	1.9	7.0	84	25	0.04	35		28	29
MAX.	1.3	7	5.0	6.4	6.6	4.1	2.4	8.1	95	28	0.04	37		850	653
MIN.	0.3	7	5.0	6.4	6.4	3.2	1.4	3.3	39	21	0.04	35		0	0
MEDIAN	0.6	7	5.0	6.4	6.6	3.6	1.9	7.8	93	25	0.04	35		5	3

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

(107) WEST BR. OF WARE RIVER @ RT. 62

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.6				5.8	4.4	2.1	10.4	71	0		60	214	1
01/16	0.6				5.8	4.9	3.0	11.0	75	0		60	132	1
01/29	0.7				5.8	5.1	3.2	10.4	71	0		62	110	1
02/12	0.7	60	15.6	11.7	5.8	5.1	3.1	11.0	75	0	0.47	83	112	1
02/26	0.6				5.9	5.0	3.0	11.4	78	0		82	74	0
03/12	0.6				5.9	5.0	2.9	12.1	83	0		82	106	0
03/26	0.6				5.7	3.3	1.5			1		60	153	5
04/09	0.5				5.8	3.3	1.4	13.6	98	2		58	120	2
04/23	0.5				5.8	2.8	0.9	9.3	84	11		42	550	0
05/07	0.9	85	10.0	8.9	5.9	5.1	3.0	5.8	55	13	0.80	53	1,200	13
05/21	1.2				5.9	5.9	3.9	4.3	43	16		55	800	11
06/04	0.8				5.9	4.8	2.9	6.6	65	15		57	167	30
06/18	1.4				5.7	3.9	1.9	5.8	63	20		42	3,000	600
07/02	1.7				5.9	6.8	4.8	2.8	31	20		63	667	240
07/16	1.8				5.9	7.2	5.1	2.6	28	20		68	500	46
07/30	2.5				6.0	8.1	6.0	1.3	14	20		62	333	22
08/13	3.8	160	12.5	10.8	6.1	10.2	8.3	0.7	8	21	2.60	68	733	48
08/27	2.5				6.1	9.2	7.3	1.2	13	21		72	133	15
10/09	2.0				6.0	6.5	4.4	6.7	55	7		78	1,700	99
10/22	2.8				6.0	6.6	4.4	4.3	39	11		88	333	3
11/05	1.6	70	12.2	8.8	6.0	5.6	3.9	7.8	64	7	0.88	65	TNTC	18
11/19	2.2				6.0	6.4	4.3	8.3	64	4		78	600	3
12/03	2.0				6.1	6.6	4.9	8.1	67	7		82	290	2
12/17	1.2				6.0	5.1	3.3	11.6	82	1		68	420	9
AVG.	1.4	94	12.6	10.1	5.9	5.7	3.7	7.3	58	9	1.19	66	527	49
MAX.	3.8	160	15.6	11.7	6.1	10.2	8.3	13.6	98	21	2.60	88	TNTC	600
MIN.	0.5	60	10.0	8.8	5.7	2.8	0.9	0.7	8	0	0.47	42	74	0
MEDIAN	1.2	78	12.4	9.9	5.9	5.1	3.3	7.8	64	7	0.84	64	312	7

11/5 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 1,080%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

(108) EAST BR. OF WARE RIVER @ NEW BOSTON

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.8				6.2	5.8	3.6	11.8	81	0		68	271	3
01/16	1.0				6.3	7.4	5.5	11.9	81	0		70	210	12
01/29	0.8				6.2	6.2	4.2	12.2	83	0		67	124	1
02/12	0.8	45	14.1	12.0	6.1	5.6	3.5	12.1	83	0	0.42	78	98	3
02/26	0.8				6.2	6.3	4.3	11.8	81	0		100	110	7
03/12	0.9				6.2	5.8	3.7	12.2	83	0		80	82	5
03/26	0.9				5.9	3.6	1.5	12.2	83	0		67	74	0
04/09	0.5				5.9	2.9	0.9	12.3	86	1		63	80	3
04/23	0.5				6.0	3.5	1.4	8.8	83	13		55	250	4
05/07	1.2	65	12.8	11.0	6.3	5.4	3.2	8.1	75	12	0.67	70	729	57
05/21	1.5				6.3	7.3	5.3	6.6	66	16		78	1,350	45
06/04	1.2				6.2	5.9	4.0	7.8	77	15		63	1,033	200
06/18	2.4				5.9	4.3	2.2	6.7	73	20		52	2,700	800
07/02	1.8				6.3	6.7	4.8	6.9	74	19		63	1,033	170
07/16	2.0				6.3	7.6	5.6	6.1	66	20		70	700	153
07/30	2.0				6.3	9.2	7.3	5.5	59	19		77	333	40
08/13	3.0	128	13.6	15.4	6.4	11.6	9.4	5.0	56	21	2.10	80	600	88
08/27	2.4				6.3	11.0	8.9	4.9	54	21		80	333	13
09/10	2.0				6.4	11.0	9.3	5.4	59	20		82	67	18
09/24	1.6				6.3	9.1	7.2	6.0	62	17		88	267	33
10/09	1.6				6.3	10.2	8.4	6.6	56	8		83	275	3
10/22	1.6				6.2	8.3	6.1	6.9	61	10		88	200	2
11/05	1.6	65	15.7	14.3	6.3	9.1	7.1	7.9	67	8	1.10	88	367	14
11/19	1.5				6.4	9.3	7.4	9.6	74	4		87	340	1
12/03	1.5				6.4	8.6	6.9	8.6	69	6		82	300	3
12/17	1.6				6.5	8.1	6.4	11.6	82	1		82	427	6
AVG.	1.4	76	14.1	13.2	6.2	7.3	5.3	8.7	72	10	1.07	75	475	65
MAX.	3.0	128	15.7	15.4	6.5	11.6	9.4	12.3	86	21	2.10	100	2,700	800
MIN.	0.5	45	12.8	11.0	5.9	2.9	0.9	4.9	54	0	0.42	52	67	0
MEDIAN	1.5	65	13.9	13.2	6.3	7.4	5.4	8.0	74	9	0.89	78	288	10

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

(105) WARE RIVER @ BARRE FALLS

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
04/23	1.2				5.9	3.5	1.5	9.0	85	13		63	300	8
05/07	1.7	95	13.2	10.8	6.3	6.5	4.4	8.7	82	13	0.88	70	480	22
05/21	2.0				6.4	6.9	4.8	8.2	84	17		88	1,150	18
06/04	1.2				6.0	5.0	2.9	7.0	69	15		68	667	120
06/18	2.3				5.9	4.5	2.4	6.7	74	21		42	TNTC	TNTC
07/02	1.6				6.1	6.9	4.7	6.4	70	20		78	1,600	140
07/16	1.7				6.1	5.8	3.9	6.7	73	20		148	100	42
07/30	2.8				6.4	9.6	7.8	2.6	29	21		117	300	27
08/13	4.2	152	16.0	15.2	6.4	11.9	9.8	5.6	62	21	2.40	92	867	62
08/27	3.2				6.5	11.6	9.5	6.0	68	22		113	200	44
09/10	2.7				6.5	10.3	8.3	6.6	76	23		103	200	80
09/24	2.3				6.2	8.2	6.2	6.7	70	18		93	267	52
10/09	2.4				6.2	6.9	4.9	9.2	80	9		130	480	9
10/22	2.7				6.2	6.2	4.0	8.8	80	11		105	267	10
11/05	2.4	108	18.8	12.5	6.3	6.9	5.1	10.4	86	7	1.40	92	560	19
11/19	2.0				6.4	7.5	5.5	11.3	87	4		90	110	3
12/03	2.3				6.4	8.3	6.6	10.6	83	5		98	430	6
AVG.	2.3	118	16.0	12.8	6.2	7.4	5.4	7.7	74	15	1.56	94	499	41
MAX.	4.2	152	18.8	15.2	6.5	11.9	9.8	11.3	87	23	2.40	148	TNTC	TNTC
MIN.	1.2	95	13.2	10.8	5.9	3.5	1.5	2.6	29	4	0.88	42	100	3
MEDIAN	2.3	108	16.0	12.5	6.3	6.9	4.9	7.0	76	17	1.40	92	365	25

6/18 THE TNTC FOR TOTAL AND FECAL COLIFORM WAS EXCLUDED WHEN CALCULATING AVG. AND MED.

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

(104) CANESTO + NATTY BROOKS AT JUNCTION -- @ RT. 62

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.6				6.2	4.6	2.8	14.2	97	0		62	420	0
01/16	0.8				6.3	5.8	3.9	15.2	107	1		62	370	1
01/29	1.2				6.4	5.8	3.8	15.5	106	0		62	240	0
02/12	0.8	38	12.3	10.8	6.3	5.0	3.1	15.3	105	0	0.42	70	140	0
02/26	0.8				6.3	5.6	3.7	15.8	108	0		93	110	0
03/12	0.6				6.4	5.0	3.1	16.8	115	0		80	66	0
03/26	0.7				6.0	2.9	1.1			0		63	73	0
04/09	0.6				5.9	3.1	1.2	14.7	103	1		62	107	3
04/23	0.5				5.9	2.9	0.9	11.0	99	11		52	250	11
05/07	0.9	80	11.2	8.9	6.3	4.4	2.6	10.9	96	10	0.88	60	1,650	14
05/21	1.3				6.5	5.0	3.0	9.9	96	14		62	1,200	9
06/04	0.9				6.2	3.9	2.0	10.0	94	13		57	533	18
06/18	1.8				6.0	3.9	1.9	8.2	86	18		47	2,150	500
07/02	2.2				6.4	5.2	3.0	8.8	91	17		55	733	320
07/16	2.2				6.5	6.1	4.4	8.8	91	17		58	467	13
07/30	2.2				6.7	7.5	5.7	3.6	37	17		60	633	9
08/13	2.7	192	11.0	12.4	6.7	8.8	6.9	7.7	84	20	2.80	63	1,000	60
08/27	2.5				6.7	8.1	6.1	7.9	86	20		62	1,067	18
09/10	2.2				6.7	8.0	5.9	8.1	88	20		63	600	350
09/24	1.7				6.5	6.3	4.2	9.2	93	16		62	733	80
10/09	1.8				6.5	6.6	4.5	11.4	92	6		60	1,171	21
10/22	1.3				6.4	5.8	4.2	9.7	86	10		60	367	32
11/05	1.4	65	10.0	9.5	6.5	6.1	4.5	11.7	96	7	1.10	58	620	11
11/19	0.9				6.5	5.3	3.6	12.9	96	3		58	720	4
12/03	1.2				6.5	5.0	3.0	12.7	97	4		62	370	2
12/17	0.8				6.3	4.0	2.0	15.0	103	0		62	613	7
AVG.	1.3	94	11.1	10.4	6.4	5.4	3.5	11.4	94	9	1.30	62	631	57
MAX.	2.7	192	12.3	12.4	6.7	8.8	6.9	16.8	115	20	2.80	93	2,150	500
MIN.	0.5	38	10.0	8.9	5.9	2.9	0.9	3.6	37	0	0.42	47	66	0
MEDIAN	1.2	73	11.1	10.2	6.4	5.3	3.4	11.0	96	9	0.99	62	567	10

QUABBIN LABORATORY RECORDS 2001
WARE RIVER AND TRIBUTARIES
(109) LONGMEADOW BROOK @ MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.7				6.1	9.1	7.2	6.8	47	0		170	71	0
01/16	0.7				6.1	10.8	8.9	6.5	44	0		172	92	7
01/29	0.9				6.2	10.8	8.8	7.6	52	0		173	114	3
04/23	0.6				6.1	6.5	4.4	5.2	51	15		120	713	2
05/07	2.2	95	30.0	21.0	6.4	15.2	13.0	3.4	32	13	1.42	150	640	10
05/21	2.0				6.3	11.9	9.9	4.4	44	16		190	1,000	14
06/04	1.7				6.2	11.1	8.8	2.9	29	16		163	300	17
06/18	1.7				5.9	5.5	3.4	3.8	41	20		80	2,800	890
07/02	2.0				6.4	17.9	15.7	1.0	11	20		178	400	100
07/16	0.9				6.0	7.7	6.1	2.5	27	20		230	100	8
07/30	1.8				6.3	19.8	17.9	1.6	17	18		230	200	11
08/13	7.3	240	45.2	28.5	6.3	23.2	20.8	0.6	7	21	5.60	220	533	72
08/27	2.2				6.1	12.8	10.8	0.6	7	21		192	667	18
12/03	3.0				6.2	10.8	9.0	4.2	32	4		210	163	2
12/17	1.7				6.1	9.3	7.2	5.5	40	2		220	230	4
AVG.	2.0	168	37.6	24.8	6.2	12.2	10.1	3.8	32	12	3.51	180	535	77
MAX.	7.3	240	45.2	28.5	6.4	23.2	20.8	7.6	52	21	5.60	230	2,800	890
MIN.	0.6	95	30.0	21.0	5.9	5.5	3.4	0.6	7	0	1.42	80	71	0
MEDIAN	1.7	168	37.6	24.8	6.2	10.8	8.9	3.8	32	16	3.51	178	300	10

QUABBIN LABORATORY RECORDS 2001
WARE RIVER AND TRIBUTARIES
(121) MILL BROOK @ CHARNOCK HILL RD.

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.6				6.5	12.1	9.9	11.1	76	0		220	186	2
01/16	0.8				6.5	13.7	11.5	11.1	78	1		220	230	20
01/29	1.3				6.5	13.8	11.7	11.5	79	0		220	168	3
02/12	0.7	30	53.0	32.8	6.6	13.4	11.4	12.0	82	0	0.28	270	104	5
02/26	0.7				6.6	11.7	9.5	12.0	82	0		260	62	1
03/12	0.8				6.6	12.9	10.7	12.1	83	0		310	100	33
03/26	0.7				6.4	7.0	5.2	12.5	86	0		250	180	22
04/09	0.4				6.4	5.4	3.4	12.6	89	1		190	140	18
05/07	1.3	45	48.5	26.5	6.8	14.4	12.3	7.8	77	15	0.58	220	400	3
05/21	1.8				6.8	13.4	11.5	7.7	81	18		260	700	16
06/04	0.8				6.5	9.9	7.8	7.6	76	16		200	367	86
06/18	0.8				6.2	6.6	4.5	7.0	75	19		168	1,100	240
07/02	2.2				6.5	14.9	12.7	6.4	71	21		180	800	280
07/16	1.5				6.5	10.9	8.9	6.7	74	21		220	300	20
07/30	1.7				6.6	13.7	11.6	6.7	73	20		220	300	23
08/13	5.0	120	47.2	29.0	6.7	16.6	14.4	6.4	72	22	3.00	220	2,000	710
08/27	1.3				6.5	13.2	11.2	6.5	72	21		220	933	17
09/10	2.7				6.8	22.4	20.4	6.3	70	21		260	600	48
09/24	2.6				6.8	23.9	21.9	6.9	72	18		240	800	70
10/09	1.0				6.7	16.4	14.3	8.7	73	8		270	883	16
10/22	1.3				6.7	19.3	17.4	7.6	69	11		280	300	3
11/05	1.2	25	54.0	34.5	6.7	18.1	16.3	8.7	73	8	0.38	250	167	1
11/19	0.9				6.7	16.0	14.1	9.8	77	5		250	230	2
12/03	0.8				6.5	11.9	9.7	9.6	77	6		350	250	3
12/17	0.7				6.5	11.1	9.3	10.7	80	3		310	440	11
AVG.	1.3	55	50.7	30.7	6.6	13.7	11.7	9.0	77	10	1.06	242	470	66
MAX.	5.0	120	54.0	34.5	6.8	23.9	21.9	12.6	89	22	3.00	350	2,000	710
MIN.	0.4	25	47.2	26.5	6.2	5.4	3.4	6.3	69	0	0.28	168	62	1
MEDIAN	1.0	38	50.8	30.9	6.6	13.4	11.5	8.7	76	8	0.48	240	300	17

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

MOULTON POND -- BELOW DAM

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.7				6.4	12.2	10.3	10.3	77	3		163	200	4
01/16	0.7				6.3	12.5	10.5	9.9	72	2		165	120	0
01/29	1.3				6.3	14.4	12.4	9.0	65	2		192	50	0
02/12	1.5	85	38.5	34.0	6.4	17.8	15.6	9.2	67	2	2.00	220	112	0
02/26	1.8				6.3	15.5	13.3	9.4	68	2		250	94	0
03/12	1.8				6.4	18.2	15.9	9.6	69	2		310	58	0
03/26	0.9				6.1	7.1	5.2	11.2	79	1		200	120	10
04/09	0.5				6.2	6.5	4.5	11.4	82	2		188	60	3
04/23	0.6				6.6	6.9	4.9	8.4	83	15		172	147	1
05/07	0.5	30	37.0	25.3	6.8	8.5	6.4	8.7	90	17	0.22	200	TNTC	20
05/21	0.6				6.9	9.0	7.0	8.3	87	18		210	TNTC	1
06/04	0.6				6.8	9.0	7.2	8.7	90	17		200	67	2
06/18	1.2				6.7	10.3	8.4	7.5	88	24		178	TNTC	TNTC
07/02	0.7				6.7	10.7	8.5	7.3	84	23		145	TNTC	27
07/16	0.7				6.9	11.2	9.2	7.5	88	24		148	273	2
07/30	1.2				6.8	11.9	10.1	6.6	76	23		160	3,000	1
08/13	1.4	48	32.0	26.3	6.9	12.9	10.9	7.2	84	24	0.80	158	1,833	70
08/27	1.3				6.8	12.5	10.6	7.0	81	23		162	1,000	2
09/10	1.5				6.7	12.9	10.9	6.0	68	22		172	167	0
09/24	0.9				6.8	12.9	10.8	7.4	81	20		168	167	11
10/09	0.8				6.6	13.3	11.6	7.5	69	12		190	1,200	1
10/22	1.5				6.5	13.7	11.8	7.0	65	12		190	433	1
11/05	0.9	30	35.3	28.0	6.8	11.6	9.7	9.9	86	9	0.28	178	300	0
11/19	0.7				6.9	11.5	9.6	10.9	85	5		178	100	0
12/03	0.6				6.9	11.9	10.1	10.4	86	7		180	20	21
12/17	1.2				7.0	11.7	9.6	12.3	89	2		180	50	20
AVG.	1.0	48	35.7	28.4	6.6	11.8	9.8	8.8	79	12	0.83	187		8
MAX.	1.8	85	38.5	34.0	7.0	18.2	15.9	12.3	90	24	2.00	310	TNTC	TNTC
MIN.	0.5	30	32.0	25.3	6.1	6.5	4.5	6.0	65	1	0.22	145	20	0
MEDIAN	0.9	39	36.2	27.2	6.7	11.9	10.1	8.7	82	12	0.54	179		1

6/18 THE TNTC FOR FECAL COLIFORM WAS EXCLUDED WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

(110) LONG + WHITEHALL PONDS @ OUTLET

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.7				6.3	9.9	8.0	9.0	63	1		175	56	1
01/16	0.8				6.2	9.8	7.7	8.7	60	0		177	40	0
01/29	1.2				6.3	10.6	8.6	8.0	56	1		187	46	0
02/12	1.2	33	42.0	24.0	6.3	11.4	9.5	7.9	54	0	0.58	193	90	0
02/26	1.5				6.2	12.1	9.9	8.0	56	1		220	22	0
03/12	1.4				6.2	11.0	9.1	7.9	56	1		220	34	0
03/26	1.3				6.2	8.3	6.4	9.1	64	1		220	112	2
04/09	1.2				6.2	7.6	5.6	8.3	62	3		210	60	0
04/23	0.5				6.4	5.5	3.5	10.0	97	14		170	62	0
05/07	0.4	17	42.0	17.5	6.6	5.6	3.9	9.2	95	17	0.17	190	28	1
05/21	0.5				6.7	6.4	4.6	8.7	91	18		250	27	2
06/04	0.5				6.7	6.0	4.0	8.8	91	17		240	100	4
06/18	0.8				6.7	5.6	3.7	7.9	92	24		240	140	67
07/02	0.6				6.7	7.9	5.8	7.1	83	24		260	56	37
07/16	0.7				6.6	9.4	7.7	6.8	80	24		270	140	25
07/30	0.7				6.7	9.3	7.6	7.2	84	24		270	TNTC	8
08/13	0.6	23	52.0	21.8	6.7	9.2	7.6	6.6	79	25	0.37	260	67	36
08/27	0.9				6.8	9.4	7.3	6.7	78	24		260	86	3
09/10	1.0				6.9	9.8	7.8	7.6	87	23		270	43	13
09/24	0.8				6.8	9.3	7.6	7.8	85	20		260	14	11
10/09	0.8				6.8	8.7	7.1	8.4	81	14		290	29	0
10/22	0.6				6.8	8.1	6.3	8.8	83	13		300	40	1
11/05	0.5	15	55.5	25.8	6.8	7.8	6.1	9.9	87	10	0.13	290	6	1
11/19	0.5				6.8	7.8	6.1	10.6	85	6		300	7	0
12/03	0.4				6.8	7.8	6.0	10.1	85	8		300	17	0
12/17	0.4				6.8	7.1	5.1	10.7	82	4		300	8	0
AVG.	0.8	22	47.9	22.3	6.6	8.5	6.6	8.5	78	12	0.31	243	53	8
MAX.	1.5	33	55.5	25.8	6.9	12.1	9.9	10.7	97	25	0.58	300	TNTC	67
MIN.	0.4	15	42.0	17.5	6.2	5.5	3.5	6.6	54	0	0.13	170	6	0
MEDIAN	0.7	20	47.0	22.9	6.7	8.5	6.8	8.4	83	14	0.27	255	45	1

7/30 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 652%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

(119) DEMON POND @ OUTLET

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.4				6.7	12.6	10.4	11.3	84	3		100	29	0
01/16	0.4				6.7	12.6	10.6	11.0	77	1		98	10	0
01/29	0.4				6.8	12.3	10.3	10.6	75	1		98	12	0
02/12	0.6	18	16.0	20.5	6.7	12.4	10.3	10.4	75	2	0.07	105	23	0
02/26	0.4				6.6	11.8	9.9	10.0	72	2		100	6	0
03/12	0.7				6.6	12.3	10.3	10.0	70	1		100	2	0
03/26	0.5				6.3	7.0	5.1	11.2	79	1		92	84	0
04/09	0.4				6.4	6.6	4.7	12.3	86	1		97	20	7
04/23	0.4				6.9	8.9	7.0	10.8	104	14		87	20	0
05/07	0.5	15	15.0	17.0	6.9	9.9	7.9	8.9	90	16	0.06	93	TNTC	5
05/21	0.4				7.0	10.1	8.0	8.5	89	18		97	1,075	1
06/04	0.5				7.0	10.1	8.3	8.4	87	17		97	1,200	15
06/18	0.7				6.9	10.3	8.4	7.1	83	24		98	533	33
07/02	0.6				7.0	11.0	9.2	7.0	82	24		100	257	47
07/16	0.5				7.0	11.1	9.4	7.5	85	22		100	43	13
07/30	0.6				7.0	11.6	9.6	7.1	82	23		100	50	3
08/13	0.5	18	16.5	18.7	6.8	11.7	9.7	5.6	66	24	0.17	100	633	92
08/27	0.5				7.0	11.8	9.8	7.2	83	23		102	333	30
09/24	0.4				7.0	12.3	10.4	7.6	83	20		102	267	10
10/09	0.4				6.9	12.1	10.2	8.4	78	12		105	700	5
10/22	0.4				6.9	12.1	10.4	8.5	78	12		107	129	11
11/05	0.4	15	17.5	19.6	6.9	12.9	10.9	9.1	80	10	0.05	108	225	3
11/19	0.4				7.0	12.8	10.7	10.1	81	6		108	180	3
12/03	0.4				7.0	12.2	10.3	9.8	81	7		108	120	58
12/17	0.4				7.1	12.3	10.3	11.1	83	3		105	27	11
AVG.	0.5	17	16.3	19.0	6.8	11.2	9.3	9.2	81	11	0.09	100.3	243	14
MAX.	0.7	18	17.5	20.5	7.1	12.9	10.9	12.3	104	24	0.17	108.0	TNTC	92
MIN.	0.4	15	15.0	17.0	6.3	6.6	4.7	5.6	66	1	0.05	87.0	2	0
MEDIAN	0.4	17	16.3	19.2	6.9	11.8	9.9	9.1	82	12	0.07	100.0	87	5

5/7 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 1,748%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVERAGE AND MEDIAN.

QUABBIN LABORATORY RECORDS 2001

WARE RIVER AND TRIBUTARIES

(102) PARKER BROOK -- NEAR MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.8				6.5	5.8	3.8	13.1	90	0		113	371	0
01/16	0.7				6.6	6.6	4.4	12.7	92	2		115	150	1
01/29	0.9				6.6	7.2	5.2	13.1	90	0		118	180	0
02/12	1.2	47	24.3	12.8	6.5	6.3	4.4	13.2	90	0	0.48	118	150	1
02/26	0.8				6.5	5.5	3.4	12.8	93	2		123	72	0
03/12	1.0				6.6	6.1	4.2	13.1	95	2		140	130	15
03/26	0.6				6.1	3.3	1.3	12.7	89	1		112	20	0
04/09	0.6				5.9	3.1	1.2	12.7	94	3		92	53	0
04/23	0.6				6.2	3.6	1.6	6.2	57	12		138	420	200
05/07	1.0	33	42.0	15.0	6.5	5.7	3.9	10.8	93	9	0.47	188	340	4
05/21	1.4				6.7	7.1	5.1	10.0	90	11		182	680	15
06/04	1.2				6.3	4.7	2.6	9.6	91	13		122	533	56
06/18	1.8				5.8	3.3	1.5	8.6	90	18		93	2,000	116
07/02	1.4				6.3	5.6	3.5	9.3	94	16		110	1,033	30
07/16	2.0				6.6	7.5	5.9	9.4	91	14		163	733	13
07/30	2.5				6.7	7.7	5.7	9.8	93	13		173	500	11
08/13	2.8	90	33.0	15.2	6.6	7.5	5.6	8.8	91	17	1.18	150	2,200	68
08/27	2.2				6.8	8.0	6.2	9.1	92	16		173	1,467	23
09/10	2.0				6.8	8.5	6.5	9.1	92	16		167	200	20
09/24	1.4				6.7	8.0	6.2	9.5	92	14		163	267	15
10/09	1.0				6.7	7.9	6.0	11.6	93	6		162	814	4
10/22	1.0				6.7	8.1	6.5	10.4	92	10		155	167	2
11/05	1.0	32	31.5	14.4	6.8	7.4	5.4	11.4	94	7	0.52	147	410	1
11/19	0.9				6.8	7.6	5.6	11.9	91	4		142	390	2
12/03	1.2				6.8	7.8	5.9	11.9	91	4		140	363	4
12/17	1.2				6.6	6.4	4.3	12.7	92	2		130	407	4
AVG.	1.3	51	32.7	14.4	6.5	6.4	4.5	10.9	90	8	0.66	140	540	23
MAX.	2.8	90	42.0	15.2	6.8	8.5	6.5	13.2	95	18	1.18	188	2,200	200
MIN.	0.6	32	24.3	12.8	5.8	3.1	1.2	6.2	57	0	0.47	92	20	0
MEDIAN	1.1	40	32.3	14.7	6.6	6.9	4.8	11.1	92	8	0.50	140	381	4

QUABBIN LABORATORY RECORDS 2001
WARE RIVER AND TRIBUTARIES
(N1) NATTY POND BROOK @ HALE RD.

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/02	0.7				5.7	6.7	4.6	8.4	57	0		78	214	1
01/16	1.2				5.8	8.5	6.3	8.7	60	0		78	150	0
01/29	1.6				5.8	9.4	7.4	8.3	57	0		78	128	0
02/12	1.5	60	14.0	12.8	5.8	8.1	6.1	8.6	59	0	0.85	80	114	1
02/26	1.5				5.8	8.2	6.0	8.4	57	0		90	64	0
03/12	1.2				5.8	7.8	5.7	9.3	64	0		92	104	0
03/26	0.6				5.6	4.2	2.3			0		73	47	0
04/09	0.5				5.6	3.2	1.3	11.8	81	0		70	107	1
04/23	0.4				5.6	3.3	1.4	7.2	68	13		62	760	2
05/07	0.9	150	13.2	10.5	5.9	6.4	4.3	6.0	58	14	1.45	68	2,000	7
05/21	1.2				6.0	7.3	5.2	4.8	47	15		70	2,133	14
06/04	0.7				5.8	4.9	3.0	5.8	57	15		60	467	22
06/18	1.6				5.6	5.1	3.1	3.5	37	19		53	1,100	270
07/02	3.3				5.9	8.4	6.3	3.4	37	20		63	667	110
07/16	3.3				5.8	8.7	6.8	2.4	25	18		65	300	17
07/30	2.3				5.9	10.4	8.1	2.5	26	18		70	100	8
08/13	3.2	200	12.8	14.8	5.9	12.7	10.4	2.0	22	21	3.60	72	600	27
08/27	2.7				5.9	10.5	8.5	1.7	19	20		70	333	7
09/10	2.5				5.9	9.4	7.2	3.0	32	19		70	600	33
09/24	1.5				5.8	7.1	5.1	3.9	40	17		63	667	33
10/09	1.2				5.9	7.4	5.5	5.5	46	8		63	514	2
10/22	1.0				5.8	6.3	4.7	6.0	53	10		62	267	0
11/05	1.2	85	12.5	9.3	5.9	5.6	3.8	6.3	52	7	1.10	62	370	1
11/19	0.7				5.9	5.3	3.6	8.8	67	4		62	560	0
12/03	0.9				5.9	5.8	4.0	7.3	57	5		65	340	0
12/17	0.8				5.9	5.1	3.1	10.2	74	2		62	340	0
AVG.	1.5	124	13.1	11.9	5.8	7.1	5.1	6.2	50	9	1.75	69	502	21
MAX.	3.3	200	14.0	14.8	6.0	12.7	10.4	11.8	81	21	3.60	92	2,133	270
MIN.	0.4	60	12.5	9.3	5.6	3.2	1.3	1.7	19	0	0.85	53	47	0
MEDIAN	1.2	118	13.0	11.7	5.8	7.2	5.2	6.0	57	9	1.28	69	340	2

QUABBIN LABORATORY RECORDS 2001
M.D.C. DRINKING WATER
VISITOR CENTER FOUNTAIN

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/25										13			0	0
02/21	0.3	5	7.5	47.5	7.8	31.8				12	0.06	132	0	0
03/26													0	0
04/25										9			0	0
05/22	1.5	5	6.4	43.4	7.8	31.0				8	0.13	120	0	0
06/27										9			0	0
07/24										9			0	0
08/21	1.5	5	6.8	41.7	7.7	29.7				9	0.15	120	0	0
09/25										10			0	0
10/23										10			0	0
11/27	1.5	5	8.3	48.0	7.7	31.1				10	0.17	133	0	0
12/13										12			0	0
AVG.	1.2	5	7.3	45.2	7.8	30.9				10	0.13	126	0	0
MAX.	1.5	5	8.3	48.0	7.8	31.8				13	0.17	133	0	0
MIN.	0.3	5	6.4	41.7	7.7	29.7				8	0.06	120	0	0
MEDIAN	1.5	5	7.2	45.5	7.8	31.1				10	0.14	126	0	0

MAIN OFFICE FOUNTAIN

01/25										14			0	0
02/21	0.4	5	7.7	47.3	7.8	32.0				13	0.06	132	0	0
03/26													0	0
04/25										10			0	0
05/22	1.5	5	6.8	43.2	7.9	31.1				11	0.13	120	0	0
06/27										13			0	0
07/24										15			0	0
08/21	1.6	5	6.9	41.5	7.7	29.7				14	0.20	120	0	0
09/25										13			0	0
10/23										12			0	0
11/27	2.2	5	8.4	48.0	7.7	31.5				13	0.30	133	0	0
12/13										12			0	0
AVG.	1.4	5	7.5	45.0	7.8	31.1				13	0.17	126	0	0
MAX.	2.2	5	8.4	48.0	7.9	32.0				15	0.30	133	0	0
MIN.	0.4	5	6.8	41.5	7.7	29.7				10	0.06	120	0	0
MEDIAN	1.6	5	7.3	45.3	7.8	31.3				13	0.17	126	0	0

RANGER STATION TAP

01/25										11			0	0
02/21	0.2	5	6.0	51.0	6.6	26.8				11	0.05	110	0	0
03/26													0	0
04/25										10			0	0
05/22	0.4	5	6.0	60.2	6.5	27.0				10	0.06	113	0	0
06/27										12			0	0
07/24										13			0	0
08/21	0.4	5	5.7	58.0	6.5	27.7				17	0.07	112	0	0
09/25										16			0	0
10/23										14			0	0
11/27	0.2	5	5.4	60.0	6.6	33.2				11	0.06	128	0	0
12/13										11			0	0
AVG.	0.3	5	5.8	57.3	6.6	28.7				12	0.06	116	0	0
MAX.	0.4	5	6.0	60.2	6.6	33.2				17	0.07	128	0	0
MIN.	0.2	5	5.4	51.0	6.5	26.8				10	0.05	110	0	0
MEDIAN	0.3	5	5.9	59.0	6.6	27.4				11	0.06	113	0	0

QUABBIN LABORATORY RECORDS 2001
M.D.C. DRINKING WATER
QUABBIN FORESTRY BUILDING TAP

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	Fe	SPCOND	TOTCOLI	FECCOLI
01/25										14			0	0
02/21	0.6	5	25.0	70.0	6.8	33.5				11	0.06	200	0	0
03/26													0	0
04/25										12			0	0
05/22	0.5	5	18.0	56.2	6.9	33.2				11	0.05	162	0	0
06/27										13			0	0
07/24										11			0	0
08/21	1.4	5	20.7	63.3	6.9	36.3				12	0.12	180	0	0
09/25										14			9	0
10/23										10			0	0
10/23										10			0	0
11/27	0.4	5	27.0	76.0	6.8	35.9				11	0.06	220	0	0
12/13										12			0	0
AVG.	0.7	5	22.7	66.4	6.9	34.7				12	0.07	191	1	0
MAX.	1.4	5	27.0	76.0	6.9	36.3				14	0.12	220	9	0
MIN.	0.4	5	18.0	56.2	6.8	33.2				10	0.05	162	0	0
MEDIAN	0.6	5	22.9	66.7	6.9	34.7				12	0.06	190	0	0

NEW SALEM FORESTRY TAP

01/08													0	0
02/05	0.2	5	68.8	92.8	6.7	27.5					0.05	340	0	0
03/05													0	0
04/02													0	0
05/29	0.2	5	74.0	95.6	6.6	27.3					0.04	360	0	0
06/25													0	0
07/23													0	0
08/20	0.2	5	76.0	96.5	6.6	26.7					0.04	360	0	0
09/17													0	0
10/15													0	0
11/26	0.2	5	74.8	93.3	6.6	26.7					0.06	350	0	0
12/26													0	0
AVG.	0.2	5	73.4	94.6	6.6	27.1					0.05	353	0	0
MAX.	0.2	5	76.0	96.5	6.7	27.5					0.06	360	0	0
MIN.	0.2	5	68.8	92.8	6.6	26.7					0.04	340	0	0
MEDIAN	0.2	5	74.4	94.5	6.6	27.0					0.05	355	0	0

WARE RIVER OFFICE TAP

01/16													0	0
02/12	1.8	5	86.0	164.8	7.6	40.4					0.18	470	0	0
03/12													0	0
04/09													0	0
05/07	2.0	5	76.0	150.5	7.7	45.3					0.22	390	0	0
06/18													0	0
07/16													0	0
08/13	1.8	7	83.0	166.2	7.6	40.1					0.20	460	0	0
09/10													0	0
10/09													0	0
11/05	1.7	5	85.0	163.0	7.6	41.5					0.19	450	0	0
12/17													0	0
AVG.	1.8	6	82.5	161.1	7.6	41.8					0.20	443	0	0
MAX.	2.0	7	86.0	166.2	7.7	45.3					0.22	470	0	0
MIN.	1.7	5	76.0	150.5	7.6	40.1					0.18	390	0	0
MEDIAN	1.8	5	84.0	163.9	7.6	41.0					0.20	455	0	0

QUABBIN LABORATORY RECORDS 2001
DATA SENT WEEKLY TO M.W.R.A.

DATE	201-WPS TOTCOLI	201-WPS FECCOLI	NASH HILL TOTCOLI	LUDLOW TOTCOLI	CHICOPEE TOTCOLI	COMMENT
01/02	2	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/03	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/04	2	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/05	LA	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/06		0		0		
01/07		0		0		
01/08	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/09	1	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/10	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/11	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/12	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/13		0		0		
01/14		0		0		
01/15		LA		0		
01/16	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/17	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/18	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/19	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/20		0		0		
01/21		0		0		
01/22	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/23	3	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/24	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/25	1	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/26	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/27	0	0		0		
01/28	0	0		0		
01/29	0	1		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/30	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
01/31	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/01	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/02	2	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/03	0	0		0		
02/04	LA	0		0		
02/05	4	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/06	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/07	1	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/08	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/09	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/10	1	0		0		
02/11	1	0		0		
02/12	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/13	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/14	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/15	1	0	0	0		
02/16	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/17	1	0		0		
02/18	0	0		0		
02/19	0	0		0		
02/20	1	0	0	0		
02/21	0	0	0	0		
02/22	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
02/23	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.

QUABBIN LABORATORY RECORDS 2001
DATA SENT WEEKLY TO M.W.R.A.

DATE	201-WPS TOTCOLI	201-WPS FECCOLI	NASH HILL TOTCOLI	LUDLOW TOTCOLI	CHICOPEE TOTCOLI	COMMENT
02/24	0	0		0		
02/25	0	0		0		
02/26	0	0	0	0		
02/27	0	0	0	0		
02/28	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
03/01	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
03/02	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
03/03	0	0		0		
03/04	1	0		0		
03/05	0	0				No MWRA samples due to snow storm.
03/06	0	0		0		From MWRA, LMS only, due to snow storm.
03/07	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
03/08	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
03/09	0	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
03/10	1	0		0		
03/11	3	0		0		
03/12	3	0	0	0		
03/13	0	0	0	0		
03/14	0	0	0	0		
03/15	6	0	0	0		
03/16	0	0	0	0		
03/17	0	0		0		
03/18	0	0		0		
03/19	0	0	0	0		
03/20	0	0	0	0		
03/21	0	0	0	0		
03/22	0	0	0	0		
03/23	0	0	0	0		
03/24	1	1		0		
03/25	3	0		0		
03/26	1	1	0	0		
03/27	2	1	0	0		
03/28	1	1	0	0		
03/29	0	1	0	0		
03/30	0	0	0	0		
03/31	3	3		0		
04/01	7	15		0		
04/02	10	6	0	0		
04/03	5	4	0	0		
04/04	13	3	0	0		
04/05	2	2	0	0		
04/06	1	2	0	0		1 Milky background on Nash Hill Totalcoli
04/07		1		0		
04/08		1		0		
04/09	1	1	0	0		
04/10	3	0	0	0		
04/11	3	0	0	0		
04/12	0	1	0	0		
04/13		0	0	0		
04/14		0		0		
04/15	1	0		0		
04/16	0	0		0		
04/17	1	0	0	0		

QUABBIN LABORATORY RECORDS 2001
DATA SENT WEEKLY TO M.W.R.A.

DATE	201-WPS TOTCOLI	201-WPS FECCOLI	NASH HILL TOTCOLI	LUDLOW TOTCOLI	CHICOPEE TOTCOLI	COMMENT
04/18	5	0	0	0		
04/19	0	0	0	0		
04/20	0	0	0	0		
04/21		0		0		
04/22		0		0		
04/23	0	0	0	0		
04/24	2	0	0	0		
04/25	0	0	0	0		
04/26	1	0	0	0		
04/27	1	0	0	0		
04/28		0		0		
04/29		0		0		
04/30	1	0	0	0		
05/01	2	0	0	0		
05/02	0	0	0	0		
05/03	2	0	0	0		
05/04	2	1	0	0		
05/05	2	0		0		
05/06	13	0		0		
05/07	0	0	0	0		
05/08	0	0	0	0		
05/09	0	0	0	0		
05/10	1	0	0	0		
05/11	2	0	0	0		
05/12	0	0		0		
05/13	13	0		0		
05/14	1	1	0	0		
05/15	0	0	0	0		
05/16	0	0	0	0		
05/17	4	0	0	0		
05/18	4	0	0	0		
05/19	2	0		0		
05/20	0	0		0		
05/21	0	0	0	0		
05/22	6	0	0	0		
05/23	6	0	0	0		
05/24	0	1	0	0		
05/25	3	0	0	0		
05/26	9	0		0		
05/27	1	0		0		
05/28	9	0		0		
05/29	2	0	0	0		
05/30	0	0	0	0		
05/31	0	0	0	0		
06/01	2	0	0	0		
06/02	3	0		0		
06/03	0	0		0		
06/04	0	0	0	0		
06/05	0	0	0	0		
06/06	0	0	0	0		
06/07	2	0	0	0		
06/08	0	0	0	0		
06/09	2	0		0		

QUABBIN LABORATORY RECORDS 2001
DATA SENT WEEKLY TO M.W.R.A.

DATE	201-WPS TOTCOLI	201-WPS FECCOLI	NASH HILL TOTCOLI	LUDLOW TOTCOLI	CHICOPEE TOTCOLI	COMMENT
06/10	2	0		0		
06/11	1	0	0	0		
06/12	0	0	0	0		
06/13	0	0	0	0		
06/14	1	0	0	0		
06/15	1	0	0	0		
06/16	4	0		0		
06/17	1	0		0		
06/18	0	0		0		
06/19	0	0	0	0		
06/20	7	0	0	0		
06/21	2	0	0	0		
06/22	20	0	0	0		
06/23	5	0		0		
06/24	4	0		0		
06/25	12	0	0	0		
06/26	0	0	0	0		
06/27	0	0	0	0		
06/28	1	0	0	0		
06/29	2	0	0	0		
06/30	3	0		0		
07/01	1	0		0		
07/02	0	0	2	0		Nash Hill confirmed (+) for Total, (-) for E.coli.
07/03	1	0	0	0		
07/04	1	0	0	0		
07/05	0	0	0	0		
07/06	3	0	0	0		
07/07	2	0		0		
07/08	3	0		0		
07/09	0	0	0	0		
07/10	2	0	0	0		
07/11	4	0	0	0		
07/12	1	0	0	0		
07/13	1	0	0	0		
07/14	0	0		0		
07/15	1	0		0		
07/16	0	0	0	0		
07/17	2	0	0	0		
07/18	5	0	0	0		
07/19	5	0	0	0		
07/20	2	0	0	0		
07/21	0	0		0		
07/22	29	0		0		
07/23	12	0	0	0		
07/24	42	0	0	0		
07/25	212	0	0	0		
07/26	22	0	0	0		
07/27	112	0	0	0		
07/28	332	LA		0		
07/29	184	0		0		
07/30	84	0	0	0		
07/31	155	0	0	0		
08/01	220	0	0	0		

QUABBIN LABORATORY RECORDS 2001
DATA SENT WEEKLY TO M.W.R.A.

DATE	201-WPS TOTCOLI	201-WPS FECCOLI	NASH HILL TOTCOLI	LUDLOW TOTCOLI	CHICOPEE TOTCOLI	COMMENT
08/02	718	0	0	0		
08/03	250	0	0	0		
08/04	197	0		0		
08/05	410	0		0		
08/06	173	0	0	0		
08/07	306	0	0	0		
08/08	343	0	0	0		
08/09	34	0	0	0		
08/10	347	0	0	0		
08/11	77	0		0		
08/12	460	0		0		
08/13	54	0	0	0		
08/14	437	0	0	0		
08/15	314	0	0	0		
08/16	429	0	0	0		
08/17	257	0	0	0		
08/18	391	0		0		
08/19	1,120	0		0		
08/20	118	0	0	0		
08/21	700	0	0	0		
08/22	1,100	0	0	0		
08/23	1,120	0	0	0		
08/24	940	0	0	0		
08/25	1,850	0		0		
08/26	2,050	0		0		
08/27	243	0	0	0		
08/28	1,100	1	0	0		
08/29	640	0	0	0		
08/30	943	0	0	0		
08/31	680	0	0	0		
09/01	980	1		0		
09/02	1,186	0		0		
09/03	1,029	0		0		
09/04	500	0	0	0		146 B.G. on Nash Hill Total Plate.
09/05	500	0	0	0		
09/06	290	0	0	0		
09/07	94	0	0	0		
09/08	320	0		0		
09/09	100	0		0		
09/10	35	0	0	0		
09/11	165	0	0	0		
09/12	220	0	0	0		
09/13	330	0	0	0		
09/14	270	0	0	0		
09/15	480	0		0		
09/16	1,000	0		0		
09/17	547	0	0	0		
09/18	5,100	0	0	0		
09/19	1,024	0	0	0		
09/20	41	0	0	0		
09/21	230	0	0	0		
09/22	300	0		0		
09/23	41	0		0		

QUABBIN LABORATORY RECORDS 2001
DATA SENT WEEKLY TO M.W.R.A.

DATE	201-WPS TOTCOLI	201-WPS FECCOLI	NASH HILL TOTCOLI	LUDLOW TOTCOLI	CHICOPEE TOTCOLI	COMMENT
09/24	165	0	0	0		
09/25	53	0	0	0		
09/26	857	0	0	0		
09/27	693	0	0	0		
09/28	1,086	0	0	0		
09/29	333	2		0		
09/30	172	0		0		
10/01	59	2	0	0		
10/02	240	0	0	0		
10/03	373	0	0	0		
10/04	110	0	0	0		
10/05	54	0	0	0		
10/06	11	0		0		
10/07	6	0		0		
10/08	54	0		0		
10/09	49	0	0	0		
10/10	120	0	0	0		
10/11	29	0	0	0		
10/12	193	0	0	0		
10/13	173	0		0		
10/14	66	0		0		
10/15	67	2	0	0		
10/16	6	1	0	0		
10/17	9	0	0	0		
10/18	8	0	0	0		
10/19	22	0	0	0		
10/20	5	0		0		
10/21	31	0		0		
10/22	3	0	0	0		
10/23	11	0	0	0		
10/24	14	0	0	0		
10/25	46	0	0	0		
10/26	71	0	0	0		
10/27	64	0		0		
10/28	62	0		0		
10/29	53	0	0	0		
10/30	33	0	0	0		
10/31	21	0	0	0		
11/01	37	1	0	0		
11/02	36	0	0	0		
11/03	12	0		0		
11/04	42	0		0		
11/05	11	0	0	0		
11/06	17	0	0	0		
11/07	15	0	0	0		
11/08	19	0	0	0		
11/09	TNTC	0	0	0		(TNTC) Background on Total above 200
11/10	TNTC	0		0		(TNTC) Background on Total above 200
11/11	17	0		0		
11/12	21	0		0		
11/13	11	0	0	0		
11/14	1	0	0	0		
11/15	7	0	0	0		

QUABBIN LABORATORY RECORDS 2001
DATA SENT WEEKLY TO M.W.R.A.

DATE	201-WPS TOTCOLI	201-WPS FECCOLI	NASH HILL TOTCOLI	LUDLOW TOTCOLI	CHICOPEE TOTCOLI	COMMENT
11/16	2	0	0	0		
11/17	11	1		0		
11/18	4	2		0		
11/19	6	1	0	0		
11/20	5	0	0	0		
11/21	3	0	0	0		
11/22	6	0		0		
11/23	2	0	0	0		
11/24	0	0		0		
11/25	6	0		0		
11/26	11	3	0	0		
11/27	12	0	0	0		
11/28	4	1	0	0		
11/29	2	1	0	0		
11/30	0	0	0	0		
12/01	17	0		0		
12/02	1	0		0		
12/03	3	1	0	0		
12/04	3	0	0	0		
12/05	3	0	0	0		
12/06	2	0	0	0		
12/07	5	3	0	0		
12/08	4	2		0		
12/09	1	1		0		
12/10	3	1		0	0	Nash Hill tap frozen, sample collected at Chicopee.
12/11	4	2	0	0		
12/12	3	0	0	0		
12/13	4	0	0	0		
12/14	0	0	0	0		
12/15	0	0		0		
12/16		0		0		
12/17	1	1	0	0		
12/18	0	0	0	0		
12/19	4	1	0	0		
12/20	1	0	0	0		
12/21	0	0	0	0		
12/22	0	0		0		A lot of "bug" parts on plate
12/23		0		0		
12/24	5	2	0	0		
12/25	0	0		0		
12/26	1	1	0	0		
12/27	1	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
12/28	2	0		0	0	Nash Hill tap frozen, sample collected at Chicopee.
12/29		6		0		
12/30	1	0		0		
12/31	1	1		0	0	Nash Hill tap frozen, sample collected at Chicopee.

QUABBIN LABORATORY RECORDS 2001

GIARDIA RELATED INFORMATION

(201) OUTLET AT TAP

DATE	TURBIDITY	TEMP.C	TOTCOLI	FECCOLI
01/08/01	0.3	3	0	0
01/22/01	0.3	2	0	0
02/05/01	0.3	3	4	0
02/20/01	0.3	2	1	0
03/05/01	0.3	3	0	0
03/19/01	0.3	2	0	0
04/02/01	0.3	3	10	6
04/17/01	0.3	5	1	0
04/30/01	0.3	6	1	0
05/14/01	0.3	9	1	1
06/11/01	0.3	10	1	0
06/25/01	0.3	11	12	0
07/09/01	0.3	11	0	0
07/23/01	0.3	11	12	0
08/06/01	0.3	12	173	0
08/20/01	0.3	13	118	0
09/04/01	0.3	13	500	0
09/17/01	0.3	14	547	0
10/01/01	0.3	18	59	2
10/15/01	0.3	16	67	2
11/13/01	0.3	12	11	0
11/26/01	0.3	9	11	3
12/10/01	0.3	9	3	1
12/18/01	0.3	9	0	0

QUABBIN LABORATORY DATA 2001
SPECIAL SAMPLES

SITE	DATE	COLIFORM COLONIES PER 100 ML. M.F. TOTAL	FECAL
BOAT COVE BROOK	03/23/01		14
BOAT COVE BROOK (CULVERT)	03/29/01		0
BOAT COVE BROOK (100 FEET)	03/29/01		2
BOAT COVE BROOK (250 FEET)	03/29/01		2
BOAT COVE BROOK (500 FEET)	03/29/01		5
#1 UNDERHILL BK. (CULVERT)	05/02/01	139	14
#2 UNDERHILL BK. (ON GATE 21 RD.)	05/02/01	500	12
#1 UNDERHILL BK. (CULVERT)	05/09/01	520	21
#2 UNDERHILL BK. (ON GATE 21 RD.)	05/09/01	1000	20
#3 UNDERHILL BK. (ON GATE 21 RD.)	05/09/01	310	14
MIDDLE BR. OF DICKEY BK.	05/21/01	2000	14
DICKEY BK. (GATE 18 RD. CULVERT)	05/23/01	800	0
WEST BR. OF PRESCOTT BK.	05/30/01	1500	7
COMET POND - 1	07/17/01		4
COMET POND - 2	07/17/01		0
COMET POND - 3	07/17/01		3
COMET POND - 4	07/17/01		0
COMET POND - 5	07/17/01		1
COMET POND - 6	07/17/01		0
COMET POND - 7	07/17/01		0
COMET POND - 8	07/17/01		0
COMET POND - 9	07/17/01		6
COMET POND - 10	07/17/01		4
COMET POND - ROPE	07/17/01		0

QUABBIN LABORATORY RECORDS 2001
SPECIAL SAMPLES

2/14/01 Samples collected and sent to Alpha Analytical Laboratory, analysis was performed for Volatile Organic Contaminants
Location - Hanger tap.
All compounds were below detection limits.

5/25/01 Samples collected and sent to Alpha Analytical Laboratory, analysis was performed for Volatile Organic Contaminants.
Location - Adams Well in New Salem
All compounds were below detection limits, except for Chloroform which was 1.1 ug/l

10/22/01 Sample collected and sent to M.W.R.A. Laboratory, analysis was performed for Nitrate and Nitrite.
Location - Hanger Tap
Nitrate 0.12 mg/L
Nitrite ND mg/L

10/22/01 Sample collected and sent to M.W.R.A. Laboratory, analysis was performed for Inorganics,
all analysis was below detection limits except those listed below.
Location - Hanger Tap
Barium 0.0223 mg/L
Fluoride 0.111 mg/L
Sodium 4.39 mg/L

10/22/01 Sample collected and sent to M.W.R.A. Laboratory.
Location - Ranger Station
Lead .008 mg/L
Copper 1.76 mg/L

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